Author: Pennsylvania Live Stock Breeders' Association

Title: Proceedings and papers of... annual meeting, 1910

Place of Publication: Pittsburgh, Pa.

Copyright Date: 1910

Master Negative Storage Number: MNS# PSt SNPaAg057.9

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Proceedings of the Twelfth Annual Meeting of the
PENNSYLVANIA
LIVE STOCK BREEDERS' ASSOCIATION

JOINT MEETING
WITH THE
Pennsylvania Dairy Union

Philadelphia, Pa., February 2, 3 and 4, 1910

H. E. VAN NORMAN, SECRETARY
Edited by A. A. BORLAND, Assistant

Proceedings and Papers

OF

TWELFTH ANNUAL MEEETING

OF THE

Pennsylvania Live Stock Breeders' Association

AND THE

PENNSYLVANIA DAIRY UNION

HELD AT

Philadelphia, February 2, 3 and 4, 1910

OFFICERS OF BREEDERS' ASSOCIATION:

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First Vice-President	S. H. GILLILAND, Harrisburg
Second Vice-President	M. P. SHOEMAKER, Greensburg
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PREFACE

Several things beyond the control of the Secretary are responsible for the incompleteness of this Annual Report. The nature of the proceedings at Philadelphia made the taking of accurate stenographic notes almost impossible. Many of the lectures were held in the open, with animals for object lessons, in some cases a dozen or more animals. Others were held indoors but were of such a nature that correct reporting was quite difficult.

After the meeting, realizing the incompleteness of the stenographic reports, they were sent to those who had made the addresses. Those which came back are published herewith, but several of the speakers found it impossible to put the stenographer's notes in form that pleased them and declined to return them. These addresses, therefore, are omitted. Several lengthy discussions, notably those on horses, alfalfa and meadows and pastures, are omitted for this reason.

Up to within a few days of the meeting at Harrisburg, January 24-27, 1911, it was thought that the reports were too incomplete to justify the publication of this Bulletin, but at the last moment decided to do the best we could, so it was rushed into type. This prevented the compilation of our usual list of stock bred by members—the first time this has been omitted. I am sure that those who realize the difficulties of the situation will not censure any official for the incompleteness of this Report but will blame circumstances over which we had no control.

Acknowledgement should be made here of the many courtesies received at the College of Veterinary Medicine of the University of Pennsylvania. Everything that thoughtful minds and kind hearts could do, for this Association, its speakers and its guests was done. The entire staff of the College and the authorities of the University of Pennsylvania deserve the thanks of all who were concerned in the meeting and of the public as well.

Those who exhibited livestock did much to make the meeting a success and did it too at considerable trouble and some expense to themselves. They should be commended for their public spirit and their assistance to our Association in its educational work.

The work of our speakers was never more appreciated by the public than on this occasion. Long after the hour of closing they were surrounded by crowds who plied them with questions. To all these speakers we return thanks. We are deeply indebted to Pennsylvania State College for its hearty cooperation, shown by permitting so many of its Agricultural School staff to assist us in our work.

No one realizes more than the officers of the Pennsylvania Livestock Breeders' Association the many omissions and perhaps errors in this Report. But please remember the difficulties of the situation and the fact that all of us work for nothing and bear our own expenses, that we are busy men and cannot devote much time to these things. It is hoped that some provision may be made for the employment of a secretary to care for the work of this and other associations, for the sake of securing more complete and accurate reports for general circulation.

E. S. BAYARD, Secretary.

DEMONSTRATIONS, CONTESTS AN LECTURES AT ANNUAL MEETINGS AT PHILADELPHIA

Probably 1,000 Pennsylvania livestock breeders, dairymen and farmers assembled at the College of Veterinary Medicine, University of Pennsylvania, Philadelphia, to witness the demonstrations and shows and to hear the talks given by experts at the annual meeting of the Pennsylvania Dairy Union and the Pennsylvania Live Stock Breeders' Association. The scope of the program was very broad. It included the annual Corn Show of the Pennsylvania Live Stock Breeders' Association, to which was added the show of apples made by the Pennsylvania Horticultural Society. The Breeders' Association had also arranged for exhibits of pure-bred livestock representing nearly all types of improved breeds, and also for horse demonstrations which included all types of horses now in use, while work horses competed for cups and ribbons. Animals fit for market were used for demonstrations on foot, and were later slaughtered and used for block demonstrations. The Dairy Union's program included demonstrations with dairy cattle and appliances, and exhibitions of milk and butter. With all the demonstrations, lectures and shows on hand at the same time, the meeting resembled a three-ring circus in some respects. The crowds were large both at the demonstrations and lectures, and the speakers were kept on the floor a long time answering questions. Almost everything was run on schedule time, however, and everybody seemed to be satisfied.

IN MEMORY OF DR. PEARSON

At Houston Hall, University of Pennsylvania, on Wednesday evening, memorial exercises in honor of the late Dr. Leonard Pearson were held, under the auspices of the Pennsylvania Live Stock Breeders' Association, of which he was Vice-President. The principal speaker of the evening was Dr. James Law, the dean of the veterinary medical profession. Dr. Law not only paid a high tribute to Dr. Pearson, but went into some detail as to his connection with various problems of interest to stockmen. He declared that Dr. Pearson had marked out the way which all veterinarians should endeavor to follow. Vice-Provost Smith, Dr. Thos. F. Hunt, W. F. McSparran and several others offered brief tributes, Letters in relation to the great service Dr. Pearson had rendered to his state were received from Governor Stuart and Senator Penrose, and read to the audience.

THE LIVESTOCK

Thursday afternoon J. B. McLaughlin, of Columbus, Ohio, discussed "Breeding Draft Horses," using some of his own magnificent specimens for examples. Mr. McLaughlin has faith in the future of the draft horse industry, but says that American farmers must pay more attention to the selection of their breeding animals and the development of their colts, in order to produce a large percentage of good horses. He made his escape after an hour or so of questioning.

Dr. Carl W. Gay, of the University of Pennsylvania, delivered one of the most instructive lectures of his career. He brought out a carriage pair and lectured on the type, how to produce them, etc. Followed that with a brougham horse, light harness horses, a gaited saddle horse, a walk, trot and canter horse, a hunter and a steeple chaser. Good specimens of all types were shown.

Nineteen entries came out for the show of heavy draft work horses, and over a score for the show of light draft work horses. It took the judge some time to make the awards in these classes, an excellent display of draft material being on hand, taken right out of the work teams of the city. Express or delivery horses shown to wagons made an imposing spectacle. Some magnificent delivery horses almost equal to carriage horses were shown in front of the finest type of delivery wagons. In order to show the type of horses required for fire use, the Philadelphia fire department sent out its heaviest truck and steamer, and made a few runs for the benefit of the crowd. Dr. Gay lectured on the class of horses required. Dr. Fitzpatrick, who arranged for this show, was warmly congratulated on the kind of horses he was using and the excellence of his turn-outs. Several horses in use in fire engines from 12 to 21 years were shown.

McLaughlin Bros., of Columbus, Ohio, sent over a car-load of horses which were used in demonstrations, and other breeders sent in stock, but the complete list has failed to reach us. Among them are:

Horses: J. S. Seal, Newtown Square; J. I. McAnany, Philadelphia; A. G. House, Philadelphia; William Kerr; J. Howard Supplee, Rosemont, harness and saddle horses. Jack: J. J. Haubert, Bala. Ponies: Senator James McNichol, Philadelphia.

Cattle: W. W. Blake Arkcoll, Paoli, Ayrshires; Cedarlin Stock Farms, Langhorne, Jerseys; J. W. Dulles, Westchester, Holsteins.

Sheep: J. F. Lantz & Co., Wyebrook, Shropshires; S. N. Hill, Markham, Southdowns; Penshurst Farm, Narbeth, Shropshires; Henry Palmer, Avondale, Dorsets and crossbreds.

Hogs: Soapstone Farm, Haverford, Duroc-Jerseys; Cedarlin Stock Farms, Chester Whites; Penshurst Farm, Berkshires.

Poultry: Soapstone Farm; Cedarlin Farm; Louis Schreiber, Philadelphia; W. J. Fretz, Philadelphia; W. W. Blake Arkcoll; J. S. Seal, Swarthmore; Dr. Carl W. Gay, Swarthmore.

Horses foar use in demonstration: Eli Kindig, Strawbridge & Clothier, Fox & Donnan—all of Philadelphia; also Philadelphia Fire and Police Departments.

All this was done at the expense of the individuals who owned the stock, and they deserve the wamest thanks for their public spirit. The local committee, consisting of Dr. C. J. Marshall, Dr. Carl W. Gay, Eli Kindig, Frank Clark, Henry N. Woolman, J. K. Shultz and A. B. Huey, was most efficient and left nothing undone to make the meeting a success.

THE EXHIBITS

The Pennsylvania State College filled one room with a splendid show which attracted much attention. The Bureau of Feeding Stuffs of the Department of Agriculture at Harrisburg had an excellent exhibition of commercial feeding stuffs and of corn from all parts of the world. The State Live Stock Sanitary Board made large exhibit of veterinary specimens.

THE APPLE SHOW

At the invitation of the Live Stock Breeders' Association the Pennsylvania Horticultural Association sent down its great apple show recently held at Tunkhannock. Messrs. Tyson, of Flora Dale, were in charge, and the interest in the exhibit never flagged. Beautiful specimens were shown, embracing all well-known Eastern varieties, and the Horticultural Association gained many friends through the geniality and ability of its representatives as well as by its exhibit. About 40 plates of apples were sold at auction and realized 50c to $1.50 per plate of five apples.

ANNUAL BANQUET

The extempore banquet held at Boothby's brought out about 125, and it was a lively occasion under the direction of Prof. H. E. Van Norman, who acted as toastmaster. He had the nerve to call down every speaker who exceeded the five-minute limit, and the result was a score of pithy speeches covering a great variety of subjects in which breeders and dairymen are particularly interested.

THE CORN SHOW

The corn show was smaller than that of last year and not generally of such good quality. Lack of moisture during the growing season showed in fewer entries and also in the corn. As usual the Yellow Dent class was the largest. It brought out a remarkable example of the value of pedigreed seed. For many years Mr. George G. Strosnider has bred his strain of Leaming corn, and it has won championship honors three times in succession at this show. This year seven growers showed this corn and took nine out of ten prizes offered. White corn took the ear championship, and it also came from Greene county. The southeastern class did not bring out such a show as was expected, the dry weather having prevented development of corn in that territory. The Corn Growers' Contest, which over thirty farmers entered last spring, brought out only four entries, the others having become discouraged by drouth. First prize, on the basis of the points given below, went to Robert A. Lowry, of Crawford county, who produced 5,406 pounds of ears on his acre. All the yields were light. Mr. Lowry's sample was not a good one, being excelled by all the rest in both size and quality, but his larger yield won the prize.

Corn Awards

YELLOW DENT.

1	George W. Eisiminger	Waynesburg
2	Burton Bayard	Waynesburg
3	Jesse L. Eisiminger	Waynesburg
4	Burton Bayard	Waynesburg
5	W. W. Ordoff	Waynesburg
6	George W. Gordon	Waynesburg
7	George G. Strosnider	Waynesburg
8	George W. Gordon	Waynesburg
9	G. Martin Cloud	Kennett Square
10	B. F. Gabler & Son	Greensboro

WHITE DENT.

1	C. P. Orndoff	Waynesburg
2	Penhurst Farm	Narbeth
3	C. P. Orndoff	Waynesburg
4	Geo. W. & C. A. Row	Yardley
5	L. W. Kintigh	Irwin
6	Lee L. Trimmer	Mechanicsburg
7	Alice S. Merchant	Penllyn
8	J. J. Hartman	Darby
9	B. B. Brubaker	New Holland

NINETY DAY TYPE.

1	G. Martin Cloud	Kennett Square
2	Post Brothers	West Alexander
3	John W. Trimmer	Mechanicsburg
4	I. N. Rhea	Freesport
5	I. N. Rhea	Mechanicsburg
6	G. A. Trimmer	Mechanicsburg
7	G. A. Trimmer	Mechanicsburg
8	W. F. Vallerchamp	New Berlin
9	S. F. Eiker	Waynesboro
10	B. F. Gabler & Son	Greensboro

WHITE-CAPPED YELLOW DENT.

1	A. T. Holman	Millerstown
2	Harry B. Herr	Lancaster
3	Allen S. Merchant	Penllyn
4	Allen S. Merchant	Penllyn
5	Alfred S. Schuyler	Turbotville
6	Joseph S. McCann	Fredonia
7	James W. More	Bethlehem
8	J. B. Funk	Clayton
9	S. E. Musselman	Allen

FLINT CORN.

1	James W. More	Bethlehem
2	J. D. McKnight	Bakerstown
3	J. H. Ferris	Little Marsh
4	T. G. Jones & Sons	Sugar Grove
5	Harry Rockwell	Canton

SOUTHEASTERN TYPE.

F. W. Levis	Chadd's Ford

This class judged by Thomas Sharpless, West Chester, Pa.

SOUTHEASTERN TYPE (Continued)

1	Harry B. Herr	Lancaster
2	George W. & C. A. Row	Yardley
3	J. G. and J. A. McSparran	Furniss
4	Jacob J. Haubert	Bala
5	E. W. Walton	Christiana
6	Jacob F. Betz	New Hope
7	B. B. Brubaker	New Holland
8	M. L. Greider	Mt. Joy
9	S. F. Eiker	Waynesboro
10	W. L. Rhoads	Lansdowne

Grand Champion Ear, an ear of Boone County White, raised by C. P. Orndoff, Waynesburg.

Grand Champion Exhibit of 10 ears, Yellow Leaming, George W. Eisiminger, Waynesburg.

Corn Growers' Contest

Yield to count 70 points, economy of production 20 points, sample of corn 5 points and report 5 points.

1	Robert A. Lowry	Shadeland
2	Lewis P. Satterthwaite	Fallsington
3	C. W. Mohler	Myerstown
4	G. A. Trimmer	Mechanicsburg

FIRST PRIZE.

Robert A. Lowry, Shadeland, Crawford County.

Preparation of Acre.

1 Date of plowing—May 15th, 1909.
2 Depth of plowing—Six inches.
3 Kind and amount of fertilizer or manure used—stable manure, about 6 loads.
4 Date of application of fertilizer—May 12th, '09.
5 Preparation of soil besides plowing—Harrowed three times and floated.
6 Distance between rows—Three and one-half feet.
7 Distance between hills—Three and one-half feet.

Corn.

1 Variety planted—Huron Dent.
2 Date of planting—May 20th.
3 Dates of cultivation—June 2d and 14th, July 1st, 2nd, 13th and 22nd.
4 Implements used—Shovel-plow and cultivator combined.
5 Date of maturity—ready to cut—About October 1st.
6 Date of husking—November 3rd, 4th and 5th.
7 Pounds of ears per acre—5406 pounds.
8 Number of stalks on acre and per cent. of barren stalks—15,346 stalks, .09 per cent. barren.

Remarks—A part of the so-called barren stalks were stalks that ears were broken off by cattle and eaten—probably 25 per cent.

The Soil.

1 Character of soil—Gravely-loom slightly descending to the West.
2 Elevation above sea-level—About 1000 feet.
3 Crops grown in previous three years—Corn.
4 Kind and amoutn of fertilizers and manurse used on the three previous crops—Stable manurse about six loads to the acre.

Comments—I am now sending you my report of my acre of corn. I have had a number of difficulties to overcome in raising this corn. We have had a very dry season here. A large flock of ducks that lived on it this fall, destroyed all that was on the ground. Also a drove of cattle broke in and destroyed a great deal. Probably about 25 per cent. of the barren stalks were caused in this way, but I am satisfied that I have a good yield.

SECOND PRIZE.

Lewis P. Satterthwaite, Fallsington, Bucks County.

Preparation of Acre.

1 Date of plowing—May 3rd.
2 Depth of plowing—Five inches
3 Kind and amount of fertilizer or manure—400 lbs. composted hill with chicken manure, Tremull's Royal Fish Fert. 2—7—3.
4 Date of application of fertilizer—May 11th Fert; May 13th compost.
5 Preparation of soil besides plowing—2 directions with cutaway harrow and twice with smoothing harrow.
6 Distance between rows—3 ft. 8 inches.
7 Distance between hills—3 ft. 8 inches.

The Corn.

1 Variety planted—Improved Leaming.
2 Date of planting—May 13th.
3 Dates of cultivation—June 8, 15, 21, 25; July 1, 6, hoed July 25.
4 Implements used—Iron-Age 2-horse cultivator.
5 Date of maturity—ready to cut—Oct. 11th.
6 Date of husking—Nov. 12th.
7 Pounds of ears per acre—4700 lbs. good corn, and 400 lbs. nubbins, and poor corn.
8 Number of stalks on acre and per cent. of barren stalks—8282 stalks, 11 per cent. barren.

Remarks—Many hills were missing owing to corn being pulled by birds. It was tarred but it didn't seem to make any difference. It was replanted also where missed. There was a lack of moisture this summer.

The Soil.

1 Character of soil—Clay loam.
2 Elevation above sea-level—About 100 feet.
3 Crops grown in previous three years—Hay.
4 Kind and amount of fertilizers and mause used on the three previous crops—Top-dressed with horse manure.

Sorry the report was not in sooner but was detained on account of getting the stover in to ascertain the cost of production. I enclose the report. I have figured that it has cost me between $20 and $25 to raise the corn for manual labor and fertilizer. This does not include the team.

THIRD PRIZE.

C. W. Mohler, Myerstown, R. 2, Lebanon County.

Preparation of Acre.

1 Date of plowing—May 8, '09.
2 Depth of plowing—6 to 7 inches.
3 Kind and amount of manure used—Stable from horses and cattle.
4 Date of application of manure—Week of March 14th.
5 Preparation of soil besides plowing—Harrowed and rolled.
6 Distance between rows—3 feet, 8 inches.
7 Distance between hills—1 foot, 2 inches.

Remark—Soil in good condition for planting.

The Corn.

1 Variety planted — Common Indian Corn.
2 Date of planting—May 13, '09.
3 Dates of cultivation—June 3, 10, 17.
4 Implements used—A 5-shoveled cultivator and a scraper.
5 Date of Maturity—ready to cut, week of October 4.
6 Date of husking—Oct. 28th and 29th.
7 Pounds of ears per acre—4800 lbs., half crop for this dry season.
8 Number of stalks on acre and per cent. of barren stalks—10,081 stalks, about 34 per cent. barren.

The Soil.

1 Character of soil—Lime stone, generally mealy.
2 Elevation above sea-level—About 475 feet.
3 Crops grown in previous three years—1906 wheat, 1907 wheat, 1908 grass.
4 Kind and amount of fertilizers and manure used on the three previous crops—1906 pure bone and potash, 200 lbs. per acre; 1907 same fertilizer, and stable manure.

FOURTH PRIZE.

G. A. Trimmer, Mechanicsburg, Cumberland County.

Preparation of Acre.

1 Date of plowing—April 14th and 15th.
2 Depth of plowing—Seven inches.
3 Kind and amount of fertilizer or manure used—Stable manure and 150 lbs. fertilizer.
4 Date of application of fertilizer—In row at planting.
5 Preparation of soil besides plowing—2 rollings and 3 harrowings.
6 Distance between rows—42 inches.
7 Distance between hills—1 kernel every 15 inches.

Remarks—Had about 80 per cent. of a stand.

The Corn.

1 Variety planted—Snow-White Dent.
2 Date of planting—May 12th.
3 Dates of cultivation—Harrowed twice in May with smoothing harrow.
4 Implements used—Cultivated twice a week till August with 1-horse cultivator.
5 Date of maturity—ready to cut—About first week in September.
6 Date of husking—November 6th.
7 Pounding of ears per acre—2425.
8 Number of stalks on acre and per cent. of barren stalks—30 per cent. barren this year.

Remarks—Crop cut down more than one-half by great drought.

The Soil.

1 Character of soil—Chestnut loam on slate ridge.
2 Elevation above sea-level—About 450 ft.
3 Crops grown in previous three years—Oats, wheat and grass.
4 Kind and amount of fertilizers and manure used on the three previous crops—About 166 lbs. fertilizer to oats and to the wheat. Stable manure on this plat was applied during last winter. A light dressing.

Proceedings of the Annual Meeting of the PENNSYLVANIA LIVE STOCK BREEDERS' ASSOCIATION

Philadelphia, Pa.,
February 2, 1910, 10 A. M.

President Norton in the Chair.

The President—Gentlemen, we will now come to order. I have the pleasure of introducing to you Prof. W. A. Cochel, of State College, who will give us a demonstration of beef cattle.

Prof. Cochel spoke as follows:

Address of Prof. Cochel.

We have met here this morning to have a demonstration in beef cattle. As we all know, the question of beef is of very vital importance at the present time, and in order that we may be better prepared to discuss market demands, we have brought in an animal with which to study and bring out the points of a good beef animal. For this purpose we have secured an ordinary market steer—one that would probably classify as a good beef steer on the market.

The cattle feeder, who feeds for the market, wants a steer that he can feed for three or four months, and then have him ready for the market. In selecting his cattle, he should pay a great deal of attention to the head. He wants a short broad, head, broad between the eyes, with a short, full neck—a blocky, low-down animal, with a deep body, indicating good digestive organs—one that will mature quickly. In selecting feeders, it is important to select one of quiet disposition, so that he will not waste his energy in restlessness, but apply it to the digestion of his food. However, when it comes to the butchers', the head is of very little importance. He gets very little for it, and it is not important with him to pay much attention to the head of the animal.

The neck comes next, and the shorter and thicker it is, the better. The meat that comes from the neck is very cheap beef. That is where we get our chuck steaks and boiling pieces, and it sells at a lower price than other parts of the animal. We want the neck thick because we want thick muscle, which indicates a thick covering over the entire body. Then, we want the shoulder and neck to blend. In a well rounded animal, you can really not tell where the neck ends and the shoulder begins. Then we want him well covered all over his shoulders. This animal is not very well covered over his shoulders. He is not well finished.

The President—Just a moment, please. We have with us Dr. Smith, Provost of the University of Pennsylvania, who will address us, and whom I have now the pleasure of introducing to you.

Dr. Smith addressed the Association as follows:

Mr. President, and Members of the Pennsylvania Live Stock Breeders' Association—On behalf of the Provost and Trustees of the University of Pennsylvania, I want to extend to you a most cordial welcome to this school of our University—the Department of Veterinary Medicine. I can assure you that we appreciate your coming here very deeply. We know the splendid work that is being done by you. We know and appreciate your efforts in behalf of Veterinary Medicine, which is a part of the great study of medicine.

I have been brought up in the country, and I know something of the conditions on the farm, and I have a love for animals. The importance of the whole subject of animal industry to this country is becoming greater every day, and I am grateful to the men who are making veterinary medicine what it is today, and who are elevating it and lifting it to a high plane. The University of Pennsylvania has always recognized things of this kind. If you will look back into its history, you will find that more than a century ago, the subjects pertaining to agriculture were discussed and taught, and so, although we have no School of Agriculture connected with it, we feel that the University of Pennsylvania is very closely allied with the farm, and the erection of this magnificent building, which is an honor to the state, is largely due to your co-operation.

In behalf of the University, and of those who are engaged in teaching in it, I bid you a cordial welcome.

The President—The response to this Address of Welcome will be delivered by Mr. E. S. Bayard, of Pittsburg.

Mr. Bayard spoke as follows:

It gives us great pleasure to come here, and we want to express our appreciation of what has been done for us by the University of Pennsylvania, and especially by the members of its Veterinary School. Everything has been made very pleasant for us all by your staff. With regard to Dr. Smith's reference to the relations between agriculture and veterinary medicine, while they have not always been harmonious in the past, we feel that we are getting closer together. Our farm animals have increased in value, and our animal industry is becoming one of the greatest sources of value in the country. In view of this, the health of our animals is becoming more important all the time, and therefore we are in better position to appreciate what you are doing here.

We thank you for what you have already done, for what you still expect to do for us, for all we know you are going to do, and, especially, for your cordial welcome.

The President—Prof. Cochel will now resume his lecture.

PROF. COCHEL—(Continued.)

We started in with the head and neck of the animal, and I want to call attention right here to one difference between the dairy and beef type. The beef cow has a short, thick neck, and the dairy cow has a long slim neck. The animal with a long slim neck is more inclined to pay special attention to the production of milk than the one with the short, thick neck. When standing behind the finished beef animal, the ribs should be so well sprung as to make the back almost level. In other words, we want to be able to draw a straight line from the shoulder to the rump, having it touch all along. In the dairy cow, we want a wedged shape—slim and somewhat narrow at the neck. increasing in width towards the rump. In the beef animal we want a straight back, because it usually indicates heaviness and thickness of the muscle.

The highest priced cut in the forequarter is the rib, where we get the prime cuts of rib, and a little farther back is where we get the sirloin and porterhouse steak. It is important that we develop just as much as possible of rib, loin and rump, for along here the high priced cuts are located. If we run a line from the point of the shoulder parallel with the ground across the body, we find that the high priced meat is above that line, while the low priced cuts, like the brisket, are under it. In selecting a beef animal we want to get just as much of him above the median line and just as little below as possible. He should be deep in his forequarters, as there lies his heart and his lungs and his vital organs, and he needs all these well developed to enable him to breathe well and to digest his food thoroughly. Then we want him to be well developed in depth of hind flank, so as to give him capacity. In a beef animal, we want an animal that will develop easily and mature quickly. In order to do this, he must be able to consume and digest a large amount of food.

When we look at him from the side, we want him to be built close to the ground. Too many are up standing and shallow, hence are not able to consume a large amount of food, consequently it does not pay to produce them. An animal that is built close to the ground will finish up easier, and mature quicker on the same amount of food. If you take these upstanding animals, you will find that they require two, three or four years to finish. As land advances, the question of producing beef animals in this section becomes an important one, and the point of early maturity is one that we cannot afford to overlook. It means dollars to the men who produce beef cattle. Then we go back here a little further, and we want the hips to be smooth. We buy feeders for possibly four and a half or five cents a pound and it costs from ten to twelve cents for each pound of gain. We find that the less prominence here in the hips and in the shoulders, the quicker he will finish. Then, we want him to carry his width straight out to the rump, so as to get a larger amount of the high-priced meat. In other words, we want a beef animal to carry his width from one end to the other. Then, there is another point in the beef animal that we must consider, that is his hind flank. We want a deep hind flank, so as to get a heavier proportion of the round, which is one of the valuable cuts of beef.

I have said nothing yet as to quality, which, aside from form, is next most important. We want quality—good handling quality—a skin that is a mellow, a loose hide. We find that the stomach and internal organs are simply a continuation of the outer skin, and if we have a good, mellow hide on the animal, digestion is good. Then there is quality of bone. We want a fine-boned animal for a meat steer, with a good covering of muscle and fat. When we find a big-boned animal, we find at the same time a big, heavy animal, that will take a long time to finish. It is possible, however, to carry selec-

tion for fine bone to excess. You want an animal whose bones are in proportion to his size, as fine bone as you can get in proportion to large development of body. The development of bone should be sufficient to hold up the body. Anything more than that is superfluous. Then comes the quality of his flesh. That should be fine grained and finely marbled. We find that meat from an animal of quality is always of finer texture than the meat from the coarse, heavy animal.

After we have selected our animal of the type and quality most desirable for the production of beef, we will find that he will consume a larger amount of rough food than the dairy cow, and of concentrated feed, also. The first thing to feed for, is for maintenance. Suppose that a thousand-pound steer eats approximately twenty pounds a day; fifteen of this goes for maintenance, and the other five into the making of beef. On the other hand, if the animal has the ability to consume twenty-five pounds, he will be just so much quicker finishing, using fifteen for maintenance and ten for production. Therefore, in selecting our animals, it is advisable that we procure them with large feeding capacity. Now, that is not so necessary when it comes to marketing. An animal that is well developed in the paunch is not so desirable, because there is too much waste.

In the feeding of this steer, and in the selection of a fat steer, there are three places in which you can judge whether or not he is fat. When the steer is finished, the outward evidences are a fullness in the throat, due to a deposit of fat at the base of the tongue, a thickness in the hind flank and a fullness in the cod due to a deposit of fat in those regions. This animal is pretty well filled out for a market animal, but the round is deficient in depth and width. As the feeding continues, his loins become thicker, and the width across the rump increased. You have noticed that when you first put a steer to pasture that his four legs seem to follow the same path, but as he fattens you will notice a difference, as a thoroughly finished steer makes two paths. His fore legs and his hind legs are far enough apart to do that. Another advantage in an animal of this kind, as compared with the dairy-bred steer, is the thickness of meat of the valuable cuts. As he becomes thoroughly ripened and fattened, this fat is distributed through the muscles, increasing their bulk. A fat steer will sell in the Chicago market for eight to nine cents; one that is not fat but in "feeder" condition will bring four to five cents. A steer like this will bring about six cents. As an animal develops a greater proportion of the higher priced cuts of meat, it becomes more valuable.

In fattening steers for market, a man must be guided largely by what he produces on his farm. The man who raises a large amount of corn and roughage has two outlets for his products. Either he can market them in the original form, or he can feed beef cattle, obtaining a market value for his crops, at the same time returning the fertility to the soil in the shape of the manure, thus making a double profit on his land. By adopting the first method, a man is much more likely to take the fertility out of the soil, as has been done in so many sections. No better method of restoring this fertility can be found than by feeding roughage crops to our cattle, and in that way get more out of the soil and out of the market than by selling the crops in their original form. The question of feeding is one that we could talk on for a couple of hours, but it is one that each man must consider for himself. We must make the most of our grass and of our pasture in feeding cattle in Pennsylvania, for which this state is well adapted. It used to be that it paid best to go West and ship the cattle from there, but as our land decreases in fertility and cattle values increased, it becomes more profitable for us to raise our own cattle. From a Pennsylvania standpoint, we want to select and handle cattle that will grow fat on grass, and with our grass crops, and our forage crops to feed, will take but little corn to fatten. That is only possible from the use of the well bred animals, which mature quicker and on less food than the scrub animal.

The question of winter feeding must also be considered. If a man has a large amount of corn, and a small amount of pasture, he can afford to produce the so-called "baby beef", but if he has a small amount of corn, and a large amount of pasture, it will pay him better to take a year or two for growth before finishing for the market, and to use nitrogenous supplements in connection with farm crops, where he does not have alfalfa. One of the best feeds for beef cattle is corn silage. The work at the Indiana Experiment Station the past four years shows that the cattle fed on silage mature much quicker and easier than those fed on anything else, and command a better price. Silage will be one of our best feeds for fattening beef cattle in Pennsylvania, as well as one of the most valuable feeds for the dairy cow.

Of course, type will have some influence on the profitable finish for market. If you have a coarse, rough animal, that nothing will ever develop into a first-class animal, you had better market him as a butcher steer. If you have a high grade beef animal it will pay better to feed two or three months longer. As we increase the quality and improve the type of our animals, we can better afford to make them fat and produce a high quality of meat than to handle the ordinary grades of cattle.

I have said nothing about dairy cattle, because we will have a dairy cattle demonstration here, and I will leave that for the dairy man; but I will say that the dairy cow stands in a class by herself as a producer of human food, and for economical consumption of forage. There are conditions, however, where it is unprofitable to produce a dairy cow. The dairy cow is broader across the hips and hind portion, and is wedged-shaped, while the beef animal carries its width straight through. In looking at the beef steer from all sides, the more nearly he approaches straight lines, the more nearly he approaches the highest type of beef animal. That is the difference between the two types of animals. The main reason that we want this thickness in the beef animal is that it gives us the thickness of meat.

These two animals are in nearly the same condition, and you will notice the difference between them. We want beef cattle to have a heavy flank; this is one of the indications of the good beef animal. Now, this animal is not an extreme beef type; it has not been fed long enough to bring out the points of a good beef steer. He has good quality and a good covering of flesh, but no great amount of fat. He has a decided droop in his back, which detracts from his value as a beef animal. The back of a beef animal should be perfectly straight. It indicates a thickness of muscle. Then, he is very deficient in the round. That might be developed, but not brought up to an ideal condition. From the butchers' standpoint, he will not dress out well enough in the choice sections. He has entirely too much weight in front for a steer of beef type; the high priced cuts are in the back. He has, however, a good coat of hair, and a good skin on him. Of course, he has not fat enough to show to the best advantage, but on the whole he is a good steer, not very well finished.

I think I have taken about all the time allotted to me. Are there any questions?

Mr. Bayard—Tell us what he is billed at.

Prof. Cochel—This steer weighed 960 pounds at Pittsburg day before yesterday. He sold for six cents a pound. He is not in the best condition, due to his shipment from Pittsburg, and spending several days in the car.

A Member—You say he is not very well finished; if he had been fed better, so as to weigh say, seventy-five pounds more, would that put him in a better condition?

Prof. Cochel—Seventy-five pounds would not finish him. In order to sell as prime, he would have to have three hundred pounds more.

Mr. Bayard—It wouldn't pay to put it on, though. He is in about the right condition for the Pennsylvania butcher market.

A Member—How much would three hundred pounds make to the butcher when he comes to sell him?

Prof. Cochel — About two hundred pounds.

A Member—Would it not be nearly all fat?

Prof. Cochel—Yes, it would be largely fat, some of which would be distributed in the lean.

A Member—Would not the butcher have to trim off the fat, so it would not be very profitable?

Prof. Cochel—That is a question of putting on fat; if the fat were distributed within the lean, it would add to the quality, and make the meat more tender. Then, of course, there would be some waste. It would add more to his internal organs. If he should add three hundred pounds more it would increase the outside layer of fat, to some extent, which, in a local market, would not be so desirable, but in a fancy steer the outside layer of fat is required because it adds to the flavor of the meat to cook it in its own fat. The whole question of finishing cattle is this: when you are finishing a two-year-old steer, you should increase his value per hundred every day; at the present price of feed, the very best possible system of feeding a steer would require a monthly increase of thirty-five to forty cents per hundred in selling value in order to insure a profit.

A Member—How does the Holstein rank as a beef animal?

Prof. Cochel—They are dairy cattle, and among the very best dairy cattle, but if developed for beef, they lose some of their very best qualities. They are not beef cattle.

A Member—But they are generally marketed for beef.

Prof. Cochel—Of course, they always sell for cheap beef, but they do not develop the very best meat. When you attempt to produce beef from a dairy animal, you make a mistake. The time to make beef out of them is as veal. The Holstein calf has as much value as veal as the Angus or the Shorthorn.

A Member—What kind of a steer would be best for the farmer to buy?

Prof. Cochel—It depends very much upon what the farmer has to feed him. If he has a large amount of roughage and a small amount of corn, the thinner he gets them in proportion to the price he pays, the more profitable. If he has a large amount of corn, he wants to buy them as fleshy as possible.

A Member—You spoke of producing "baby beef". What breed would you recommend the Pennsylvania farmer to use?

Prof. Cochel—The Hereford, the Angus, or the Shorthorn are the best. In the production of "baby beef", the calf wants to have the milk of the cow, and learn to eat corn while suckling. If it is weaned at six months of age it will take from eight to twelve months of heavy feeding to make prime baby beef.

A Member—How is the marbling of meat produced?

Prof. Cochel—It is part of the breeding of the animal. In the first place, you want an animal of the beef breeds, so that it will distribute the fat among the lean, and in the second place, it comes from feeding. If fed strictly on corn and timothy hay, the animal will not develop as much marbling or as quickly as if fed on the more nitrogenous feeds, like alfalfa hay or bran—but bran is too expensive to feed beef.

A Member—Do you not get better results from the feed given a calf or a one-year-old, than from an animal three or four years old?

Prof. Cochel—Undoubtedly we do, but they do not increase quite as rapidly in value per hundred while we are feeding them. When we are feeding the younger animals we must feed a larger proportion of corn and less roughage than with the mature animal, but if you look at it from the point of the amount of digestible food required to produce a pound of beef, the younger the animal, the better. In the work I have been doing the past four years, we have been buying calves, yearlings and two-year-olds and feeding them for market for experimental purposes. We find that our two-year-olds will be ready for market after five or six months of full feeding. Our yearlings require a month or six weeks longer, while the calves require about three months longer to get the same degree of finish.

A Member—What would be the rate of progress?

Prof. Cochel—The two-year-olds may be more expensive to begin with, but they make a more rapid gain, so it makes them less expensive in the end.

A Member—How long would it be possible to have the calves run around with the herd of cows, and still insure a calf every year?

Prof. Cochel—I was brought up in Missouri, where we are in the habit of letting our calves run with the cows all the time. We usually wean our calves at six months, and expect to get a calf every year. We allow them to run in the blue grass pasture in the summer. If they drop their calves about pasture time, we usually turn them into the field and then carry the cows over winter on roughage. We give all the advantage to the calves, and by weaning time expect them to weigh 500 pounds.

A Member—Do you let the cow go dry during the winter?

Prof. Cochel—Yes.

The President—Gentlemen, we have another demonstration on for this morning, so I guess we will have to close this one. The next one will be a demonstration on Swine, by Prof. Minkler of the New Jersey Agricultural College, which will be held outside.

Afternoon Session

MEADOWS AND PASTURES

Dr. Hunt, State, College

Tuesday, February 2, 1910,
2 O'Clock, P. M.

The afternoon session was held in Houston Hall, University of Pennsylvania.

President Norton in the Chair.

The President—The meeting will please come to order. I have the pleasure of introducing to you Dr. Hunt, Dean of the School of Agriculture at Pennsylvania State College, who will talk to us on "Meadows and Pastures."

Dr. Hunt spoke as follows:

The Flemish had a proverb: No grass, no cattle; no cattle, no manure; no manure, no crops.

What these lowland farmers of Europe meant was that good grass is the basis of good agriculture. We are not without illustrations in this country, as, for example, the famous blue grass region of Kentucky. Every practical farmer knows that if he has a good, heavy sod to plow up he may reasonably expect, other things being equal, to secure a good crop of corn, while if his meadow is allowed to run out the chance of a successful crop is very much lessened.

It has been the custom to apply yard manure to land for corn and to use commercial fertilizers for wheat, but the value of the fertilizers, particularly commercial fertilizers, in increasing the growth of grass and thereby building up the fertility of the soil has not been generally understood. It is true that some farmers do top dress their meadows with yard manure and this is a good practice but very few have applied commercial fertilizers to their grass lands. After some years of investigation of this subject I believe it safe to assert that the same money used in applying commercial fertilizers to grass lands will bring a greater profit than when applied for corn or wheat. Of more importance, however, is the fact that while obtaining this greater profit the land is made more productive for succeeding crops. This does not mean that fertilizers may not be used to advantage for either corn or wheat, but merely that a still greater profit results when applied to grass lands.

This paper has only one purpose. It is to demonstrate so clearly and forcibly that the above statements are true that land owners will be induced to act upon them.

In the address on "Soil Fertility" delivered before the last meeting of the Pennsylvania State Board of Agriculture, the speaker touched briefly upon the importance of clover in keeping up the fertility of the soil. It is desired to develop a little more in detail the lesson of these fertilizer experiments at the Pennsylvania Station with reference to the influence of common red clover. Those who listened to the address of last year or who have read the bulletins of the Pennsylvania Station know that these fertilizer experiments which have been in progress twenty-eight years consist of four tiers, each containing thirty-six eighth acre plats. The four tiers represent a complete four-year rotation of corn, oats, wheat and hay (clover and timothy). The fertilizers are applied to the corn and wheat only, thus being applied on alternate years or twice in the rotation.

It so happens that there are five plats on each tier receiving no fertilizers of any sort while there are four which have received only mineral fertilizers, consisting of 48 pounds of phosphoric acid equivalent to 320 pounds of 15 per cent. dissolved bone black or dissolved rock phosphate and 100 pounds of potash equivalent to 200 pounds of muriate of potash, 80 per cent. purity. The following table shows the average yield of the seven products of the rotation during the last five years of the first twenty-five years, where there was no fertilizer and where mineral fertilizers were applied. These years have been chosen because the conditions probably more nearly represent the comparative results to be obtained on run down limestone soil.

Average 5 Years, 1902-6.

	No treatment 5 plats	Phosphoric Acid 48 Potash 100 4 plats
Corn, ears, bu.......	35.6	51.4
Corn, stover, lb......	1711	2685
Oats, grain, bu......	23.4	34.4
Oats, straw, lb......	1110	1693
Wheat, grain, bu...	10.5	19.9
Wheat, straw, lb....	816	1627
Hay, lb.	2329	4469

During the last five years, 1902-1906, in place of 36 bushels of corn where no fertilizer was applied 51 bushels were grown where mineral fertilizers only were used. There were 34 bushels of oats in place of 23 bushels, 20 bushels of wheat in place of 10½, and nearly 2¼ tons of hay in place of a little more than a ton. This was done at an annual cost of $3.20 per year, but if we are correct in believing that the application of potash was excessive and could be reduced one-half, then the result would be obtained at an annual cost for fertilizer of $2.20.

This photograph shows the hay raised this year (1909) on plats 13, 14 and 15 of Tier 3. Below is shown the treatment as follows:

	Treatment	Yield
Plat 13............	Plaster, 320 lb.	1408
Plat 14............	No treatment	1216
Plat 15............	P 48, K 100	4496

Plat 14 has received no fertilizer in twenty-eight years, while plat 15 has received the mineral fertilizers every other year. The first plat yielded at the rate of a little over half a ton of hay, while the latter produced at the rate of nearly 2¼ tons. It will also be observed that but little result was obtained from the application of 320 pounds of land plaster. The principal reason for introducing this photograph, however, is merely to impress my hearers with the fact that these were actual results obtained from real land.

The purpose of calling attention sharply to the results obtained from the use of these mineral fertilizers, phosphoric acid and potash, is not for the purpose of pointing out their value in keeping up the fertility of the soil so much as it is to call attention to the vast importance of clover and other leguminous crops in supplying the nitrogen. Nitrogen is absolutely necessary to growing crops. It usually is the first element to be exhausted from the soil. It is the most expensive element to replace, costing about 20 cents a pound as compared to five cents for phosphoric acid and four cents for potash.

The three principal methods of keeping up the nitrogen supply of the soil open to the average farmer are, (1) by raising clover or other leguminous crops, (2) by carefully saving through the use of proper bedding the liquid excrement by animals, since it is the liquid excrement that contains most of the nitrogen, and (3) by buying nitrogen in commercial fertilizers at twenty cents a pound for the nitrogen contained. All three ways are good in their place. It is safe to say, however, that the farmer who raises staple farm crops and does not have a systematic rotation in which clover or some other leguminous crop enters is slowly going into bankruptcy.

But, it may be said, I cannot raise clover any more. It must be admitted that there is a vast area, more than ten million acres in New York, Pennsylvania and Ohio, known as the Volusia series of soils on which in recent years great difficulty has been found in raising red clover. The distribution of this series of soils is shown roughly on this map. It so happens that the speaker lived for some years on the edge of this area and studied the soil conditions with considerable care. Some experiments were planned and carried out by Cornell Station in order to determine, if possible, why clover failed so completely on certain of these soil types, epsecially that type known as the Volusia silt loam.

A careful study of all the probable factors influencing the growth of red clover was made. Among other things experiments were made to determine the influence of lime, yard manure and commercial fertilizer in producing red clover. One of these trials was conducted on a loam soil at Cherry Creek, Chatauqua County, New York, described as a once fertile farm that had become so poor that the former owner had lost it. The following table shows the method of treatment and the results obtained during 1908. The mammoth clover was sown in oats the previous year. To avoid misunderstanding it should be stated that other results, not given here, indicated that common red clover was to be preferred to mammoth clover.

Yield of Mammath Clover in 1908 at Cherry Creek, Chatauqua County, N. Y.

No. plats	Treatment	Unlimed	Limed
5	Nothing	1824	3852
1	P, K	2349	4174
1	P, K, N	2235	4085
1	15 tons manure	2091	4976

P—Acid phosphate, 100 lbs.
K—Muriate of Potash, 50 lbs.
N—Nitrate of Soda, 100 lbs.

Here the most important result was obtained by liming and here the best results were obtained by both manure and lime. Where there was a combination of manure and lime 2½ tons of hay were obtained in place of a ton without treatment. Not only was the yield of hay increased but the character was changed. Although only mammoth clover was sown, on the unlimed plats the principal grass growing with the clover was red top, while on the limed plats the redtop was replaced in part by timothy which made a strong growth.

In another experiment made in Tompkins County where the soil type, Volusia silt loam, was much less productive yard manure gave much less favorable results. The unlimed and unfertilized area yielded 1015 pounds of hay; the limed area which received mineral fertilizers yielded 1929 pounds of hay; while the limed area which receives yard manure yielded only 1555 pounds of hay. In other words, the stable manure caused an apparent decrease in yield. This second experiment, however, in no way detracts from the lesson to be derived from the Chatauqua County experiment. It merely shows that other conditions exist to prevent the manure becoming effective. In this particular instance it was probably due to the manure emphasizing the effect of the severe drouth.

Any land, which when sown to clover and timothy, produces in their stead chiefly redtop and sorrel (Rumex acetosella), will be benefited by the use of lime. Apply anywhere from 1000 to 4000 pounds or from 15 to 50 bushels. In the opinion of the speaker it does not matter greatly how much is applied, when it is applied, or what kind is applied. The chief thing is to get finely divided lime into the soil. Ordinarily it may be applied on top of plowed land when it is being prepared for corn. One may buy recently burned quick lime and allow it to slake in piles, or buy slaked or hydrated lime or ground or pulverized limestone provided it is ground finely enough. It should be remembered, however, that it

takes about 1350 pounds of hydrated lime and about 1800 pounds of pulverized limestone to furnish as much actual lime as 1000 pounds of pure quick lime.

There is one lesson, however, that every land owner should not forget, viz., that while lime with manure will increase the yield the continued use of lime without manure may decrease it. Lime cannot take the place of fertilizers nor can fertilizers take the place of lime. Here is a photograph of three plats showing the yield of timothy and clover from tier 3 of our fertilizer series.

No. plat	Treatment	Yield of hay 1909, lb.	Yield all products 1882-1906
22	Manure, 6 tons Lime, 2 tons	5784	18016
23	Lime, 2 tons	1880	11632
24	No treatment	1040	11663
16	Manure, 6 tons	4008	17383

Plat 22 has had six tons of manure once in two years and two tons of quick lime once in four years.

Plat 23 has received the lime the same as plat 22, but has not been manured, while plat 24 has had nothing done to it during the past twenty-eight years. Another plat (plat 16) not shown in this picture has received the same amount of manure as plat 23 but has not received any lime.

Having demonstrated the importance of clover or other legumes in maintaining the supply of nitrogen and having emphasized the importance of lime where needed in maintaining a good stand of clover the next step is to demonstrate the importance of commercial fertilizers in maintaining meadows. In 1903 the Cornell Station began the study of timothy from a great variety of standpoints. Among the experiments started was one to determine the influence of fertilizers in increasing the yield of pure timothy hay. A piece of well-worn but not exceedingly infertile land known as Dunkirk clay was used. It was the intention to seed the timothy in 1903 with wheat. The land was prepared and fertilized that fall but rains set in and prevented sowing the wheat. Oats and timothy were, therefore, sown in the spring of 1904. The chart shows the actual average yield per acre of timothy hay obtained from the different plats during 1905, 1906 and 1907.

Average Actual Yield of Timothy Hay per Acre During 1905, 1906 and 1907.

No. of plats	Treatment	Weight, lb.
8	Nothing	2901
1	P.	4233
1	K	4490
1	N	4530
1	P, N	4797
1	P, K	4127
1	K, N	5127
6	K, N, P	6615
1	10 tons manure	5093
1	20 tons manure	7293

Commercial fertilizers were applied in the fall of 1903 as previously stated and directly to the timothy in the spring of 1905, 1906 and 1907 just as the grass was starting. Stable manure, however, was applied only in the fall of 1903 and in the fall of 1906. In the latter case, of course, as a top dressing. The average of eight nothing plats during three years shows a yield of timothy hay of about 1½ tons. The yield obtained from plats treated with commercial fertilizers varied from two to over three tons per acre, while the plats receiving yard manure varied from 2½ to 3½ tons. In order to show the effect of the fertilizers more distinctly this chart has been prepared.

Timothy Hay on Dunkirk Clay at Cornell University.
Average Results 1905, 1906, 1907.

	Apparent increase in yield, lbs.	Net annual gain to fertilizer, 4 years
N	1211	$1.71
P	682	1.13
K	988	2.03
N, P	1614	1.91
N, K	2082	4.55
P. K	1079	1.85
N, P, K............	2632	5.46
10 tons manure..	2975	9.37
20 tons manure..	5175	14.60

N—160 lbs. nitrate of soda.
P—320 lbs. acid phosphate.
K—80 lbs. muriate of potash.

Note that N stands for 160 pounds of nitrate of soda equal to 25 pounds of nitrogen, P for 320 pounds of acid phosphate equal to 50 pounds of phosphoric acid, and K for 80 pounds of muriate of potash equal to 40 pounds of potash. The manure has been estimated in this state at one dollar a ton or load. The first column shows the apparent increase in yield due to the treatment, that is to say, it shows how much greater that yield was than on adjacent unfertilized plats.

The yield of oats in the year 1904 is not shown in this chart. While the fertilizers caused an increase in the yield of oats, the increase was not sufficient to pay for the fertilizers. In preparing the second column, therefore, in order not to overestimate the value of the fertilizers the loss from the use of them when applied to the oats has been subtracted. It is evident from this table that nitrogen was the most important element in increasing the growth of timothy on the soil in question, and that next to that potash caused the greatest gain in weight. However, as is usually the case a complete fertilizer gave a larger yield than any two elements. Counting yard manure worth one dollar a ton the great value of stable manure is shown in producing timothy. The value of the manure may be stated in another form. Neglecting entirely the increased yield of oats due to the application of manure and estimating timothy hay at $10 a ton the manure was worth $2.18 a ton or load when ten tons were applied and $1.94 when twenty tons were applied. As the experiment progresses the smaller application of manure becomes relatively more valuable per ton of manure applied. In general terms a ton or load of manure produced about two dollars' worth of hay when the latter is worth $10 per ton.

This experiment emphasizes the readiness with which timothy responds to fertilizers of any kind in this humid climate. Almost any good tillable land in Pennsylvania can be made to yield from two to three tons of hay per acre in an ordinary season. In 1908 the Pennsylvania Experiment Station weighed twenty-fou tons of well-cured hay from 5 2-3 acres. The previous year certain portions of this same area yielded at the rate of 5 tons and 189 pounds of hay per acre, although the weight of the whole field was not determined in that year. In 1908 the Experiment Station had two fields in timothy and clover. From one field of nine acres 42 loads of hay were obtained, from another field of exactly the same soil type eight loads of hay were obtained from twenty acres. The first had been well farmed, the second had not.

The whole story of the timothy meadow experiment has not been told. The most important part of the story is yet to follow. The purpose of this experiment was not primarily to determine the direct value of commercial fertilizers in increasing the yield of timothy hay but to determine whether the fundamental principle underlying the old Flemish proverb was sound, namely, that good grass was essential to a good agriculture.

After these plats were in timothy for three years they were plowed up and planted to corn without the addition of any fertilizer whatever in order to determine the residual effect of the fertilizers on the subsequent crop. These results have not yet been published but Professor J. A. Bizzell of the Cornell Experiment Station has furnished me the detailed results in which it is shown that the eight plats which during the previous year had received no fertilizer, gave an average yield of 30.4 bushels of corn per acre, while the six plats which had received a complete commercial fertilizer gave an average yield of 56.8 bushels or a gain of 26.4 bushels, while the two plats which twice in the previous four years had had two applications of stable manure gave an average yield of 67½ bushels, or a gain of 37.1 bushels per acre. A handsome profit had already been made from the use of commercial fertilizer and the stable manure. The gains, therefore, represent almost clear profit since the only additional cost was that of harvesting the increased yield. This is taking no account of the increased yield of stover which was nearly, although not quite, as marked as that of the grain.

Even to the hardened investigator these results come almost as a revelation. It is all so simple. All that was done was to apply broadcast by hand at the right time from one-tenth to one-fifth of an ounce per square foot of a commercial fertilizer containing the proper proportion of nitrogen, phosphoric acid and potash. If, however, results which have been given are to be duplicated the greatest care must be taken to have the conditions and methods correct. To obtain the best results three things are essential: (1) there must be a proper stand of grass. (2) the fertilizers must be applied at the right time, (3) the fertilizers must be of the proper character.

One reason why good results are obtained by the use of commercial fertilizers on grass land is due to the fact that there are so many plants to the acre and that the soil is so full of plant roots ready to make the fullest use of fertilizers applied. It is highly important also that the plants growing upon the land shall be the right kinds. Not only will the wrong plants or weeds reduce the quality of the hay but they usually reduce the yield because generally they will not produce the same weight as would the timothy or clover which they displace. Where, therefore, the meadows have run out and a poor stand of grass remains, the land should be plowed, limed if needed, and put into a systematic rotation. There will then be a stand of grass that it pays to maintain by the use of commercial fertilizers. As an illustration a trial made at the Pennsylvania Station during 1909 may be mentioned.

The Pennsylvania State College has recently added a run down farm of 200 acres to its holdings. A certain twenty-acre field which was in wheat when purchased was this year in grass, mostly timothy. The land was too poor to obtain a good catch of clover, although an abundance of seed was sown. Even the timothy was a poor stand. From 11.7 acres of this plat six loads of hay were obtained. These loads were not weighed but if we estimate them at 1700 pounds each 875 pounds of hay per acre is obtained. On the remaining 8½ acres on April 5, 1909, just as the grass began to grow, commercial fertilizers were applied at the following rate per acre: acid phosphate 150 pounds, muriate of potash 50 pounds, sodium nitrate 150 pounds. From this 8½ acres eleven loads of hay were obtained while from the 11.7 acres unfertilized but six loads were obtained. If the loads are again estimated at 1700 pounds per acre the yield in place of being 875 pounds per acre was 2200 pounds per acre. The cost of the fertilizer not including the cost of application was $5.57 per acre or about $8.40 per ton of hay. While this is a fairly satisfactory result it is not what it should have been because of the poor stand of grass.

The second important consideration is the time of application of the fertilizer. It is very important that the commercial fertilizer should be applied just when the grass begins to start in the spring. The station is of the opinion that a delay of even a week at this time may seriously interfere with the effectiveness of the fertilizer. In order to get the best yield of hay it is essential to get a good, strong growth during the cool, moist portions of the season. It is during this time that we have the least productive soluble nitrates in the soil and hence doubtless the nitrate of soda supplies the necessary nitrogen in the right form for the plants.

Third, in order to get the best results with commercial fertilizers on grass lands, it is necessary to apply a commercial fertilizer containing the right proportion of nitrogen, phosphoric acid and potash. No absolute rule can be laid down for all lands and conditions, but for average conditions the application to grass lands of 25 pounds each of nitrogen, phosphoric acid and potash is recommended. This may be obtained by applying 350 pounds of a 7—7—7 mixed fertilizer or by applying a mixture composed of 150 pounds of nitrate of soda, 150 pounds of acid phosphate and 50 pounds of muriate of potash. It will be noticed that the ordinary mixed fertilizer commonly used for wheat and corn is relatively too high in phosphoric acid and too low in nitrogen.

There is time for only a word about pastures. While quantitative results have not been obtained it has been abundantly shown that pastures may be improved by the application of either natural or commercial fertilizers. Where pastures are heavily grazed and the animals fed little or no other food, usually they gradually decline. If, however, the cattle are fed considerable concentrated food, especially of a highly nitrogenous character, or if the pastures are top dressed with manure or commercial fertilizers they may steadily grow better. An occasional application of seed, the clipping of the weeds and the harrowing of the fields will also contribute to this end.

The one lesson above all others that the Pennsylvania Station desires to teach, is that the soil cannot be made fertile economically at a single stroke, and that land can only be kept up to its highest productive capacity by a carefully and wisely ordered system of cropping, cultivation and fertilization.

In the address made a year ago the speaker suggested as a means to that end a five-course rotation that might meet the needs of many farmers. The rotation recommended was corn, oats, wheat, each one year, and timothy and clover two years. On a limestone soil the following fertilization was suggested: for corn, six tons of manure per acre; for oats, no fertilizers except when beginning to build up the soil, in which case 150 pounds of acid phosphate was recommended. For the wheat apply 350 pounds of acid phosphate and 100 pounds of muriate of potash. No fertilizer was recommended for the first crop of hay, for the second crop an application of six tons of yard manure applied the previous summer or fall and if yard manure is not available the application in the spring just as the grass begins to start of commercial fertilizer just recommended for grass lands.

Another rotation is here suggested, not because it is any better than the one previously recommended but merely to show the responsibilities of building up the soil through the application of commercial fertilizers to grass lands.

A Seven Course Rotation.

Year Crop	Fertilizer	Am't
1..Corn	Yard manure	6 ton
2..Corn	Yard manure	6 tons
3..Oats	Nothing	
4..Wheat	Acid phosphate	350 lbs.
	Muriate of potash	100 lbs.
5..Clover and timothy	Nothing	
	Nitrate of soda	150 lbs.
6..Timothy	Acid phosphate	150 lbs.
	Muriate of potash	50 lbs.
	Nitrate of soda	150 lbs.
7..Timothy	Acid phosphate	150 lbs.
	Muriate of potash	50 lbs.

Modifications of this rotation will occur to every practical farmer. The purpose here is to indicate the application of our present knowledge of the means of maintaining soil fertility to actual farming conditions and to emphasize the importance of some system if the best results are obtained.

A Member—I was just going to say something about the practice of putting lime on grass. In south-eastern Pennsylvania, when I was a boy, the farmers always put lime on the land before it was put in corn. I am now working a farm on which there was a large kiln thirty years ago, and you can see the good effects of it in land that has been in clover and blue grass ever since. I have never seen heavier clover.

The President—I guess we will have to move on. We will now have an address on "Success with Alfalfa", by Mr. E. T. Gill, of Haddonfield, New Jersey. Before he begins, I want to announce the following committees:

Committee on Resolutions: Prof. H. E. VanNorman, Thomas Sharpless and J. E. Dodge.

Committee on Nominations: R. L. Munce Dr. Carl Gay, W. W. Blake Arkcoll.

Auditing Committee: James Blair, Henry Palmer.

Committee on Banquet: Prof. H. E. VanNorman, G. B. Brown, and W. C. Norton.

If any of you have not yet paid your dues, the Treasurer, Mr. Lantz, is here, ready and willing to take your dollar at any time.

Mr. Lantz—I just want to introduce myself. Perhaps some of these people don't know me. I am a little timid about asking for money. I have quite a good deal of my own money scattered throughout the state because I am too timid to ask for it. Now, if I have to write to the members of the Association and ask them for their dues, it will take a two-cent stamp for every letter, and another for the receipt, and it will cost you two cents to send me that dollar. So please don't ask me to write to you for it. Just hand me your dollar while you are here, and I will give you a receipt for it. The Association needs the money, and we also need a great many new members. I don't wish to flatter Dr. Hunt, but I will say that this one lecture this afternoon will be worth to us our membership fee for the entire year. Please, therefore, don't hesitate to look me up and pay your dues.

The President—It is not only your dollars we want, but we want your help in the live stock industry of this state. We need your help as well as your dollar.

The audience adjourned to the court yard, where to listen to the Sheep Demonstration given by Mr. H. Noel Gibson, of Millbrook, New York, who spoke as follows:

ALFALFA IN THE EAST

E. T. Gill, Haddonfield, N. J.

As I have listened to the interesting speakers address this great audience, I have been deeply impressed with the importance of agriculture and the vastness of our opportunities. 'Tis truly said that the farmer is the bone and sinew of a nation, for the feeding of the people is the most important, honorable and scientific occupation of man. The wealth of a nation, its social status and all that makes for its betterment can be measured by its agriculture more than by any other

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industry. When at this age you find young men and women leaving the farm or ashamed of their work, depend upon it they are lacking proper education and training to fit them for this most important of occupations. Let all the schools teach the science of agriculture and mankind will worship, through nature better understood, nature's God.

It has been said, and properly so, that corn is king and I have been invited here today to speak of the queen of forage crops— alfalfa. King and queen they sit together on the agricultural throne, ready to feed at all times all animals necessary to man. Together they make a balanced ration, the corn supplying the carbohydrates, the fuel for the body, while the alfalfa supplies the protein to make muscle and milk. Alfalfa is not a new plant. All the agricultural papers write of it and probably every farmer before me has had more or less experience with it. For thousands of years it has been grown in Europe. From Spain it was taken to Chili and 50 years ago it reached California; so that today thousands of acres are grown throughout the West. Arthur Young, in his travels in France 120 years ago, speaks of seeing alfalfa there and the necessity of using lime, etc. From the minutes of the old Philadelphia Society for the Promotion of Agriculture I see one of its members grew alfalfa 110 years ago in Delaware with considerable success, and probably abandoned it because of the difficulty in plowing, as in those days their farm implements were crude.

Alfalfa is the most profitable crop a farmer can grow. It is more certain than wheat and does not impoverish the land as wheat does. When once started there is no annual reseeding. Today land is selling in Kansas for $150 per acre that cost less than $10 ten years ago. Today in New Jersey and Pennsylvania 3 to 6 tons per acre of alfalfa is grown that sold in the market last winter for from $25 to $27 per ton. The experiment Stations declare, and I know from experience they are correct, that a ton of alfalfa, properly cured, is worth as much for feeding as a ton of bran. Not only is it valuable as a food for animals but it is the greatest soil enricher known to man. It gathers its nitrogen from the air and with its wonderful root system it penetrates the earth from 5 to 20 feet, going down where no other plant roots go and reaching the mineral elements of the lower subsoils, bringing them to the surface and converting them into merchantable commodities. They push down and down, making humus and nitrogen far below where any other roots have put it, depositing it there for future use; through these innumerable perforations the rains filter, carrying down other fertilizations from the surface.

I believe there are portions of every farm in Pennsylvania where alfalfa can be successfully grown. Take your hillsides, make them rich in humus, add plenty of lime, inoculate, sow your seed and you have it. Wherever corn and jotatoes will grow, so will alfalfa. It is too late now to sow alfalfa and in this locality I would suggest sowing between August 20 and September 1. Now we will suppose you intend sowing a field next year—I will tell you how I would do it. Say you have a corn field. Cover this field now with good stable manure, for it will add both humus and fertility. Next spring as early as possible plow this field and spread over it a ton and a half of lime, for lime is one of the most necessary things for the successful growth of alfalfa. It not only corrects the acidity of the soil—for alfalfa will not grow in acid soil—but the alfalfa feeds on lime. A ton of alfalfa hay takes from the soil 54 pounds of lime. The ash of alfalfa contains 40 per cent. of lime, while timothy hay ash contains but 19 per cent.

If you are so situated that you can get ground limestone use four or five tons of that on an acre, but if your soil is acid better use first in addition to ground limestone 20 bushels of caustic lime, as the ground stone is not so active and may not correct the acidity soon enough for the plant. A few days after the lime is spread sow 1½ to 2 bushels each of Canada field peas and oats. These will be ready to harvest for hay the last of June or first of July and as soon as completed, while the soil is moist, disk the field over several times each way. This is better than plowing as the capillarity of the soil is not affected. Continue disking and harrowing the land to maintain a good seed bed and conserve the moisture. During one of these cultivations and on a cloudy day or later in the afternoon apply broadcast to each acre 500 pounds of inoculated soil from an old alfalfa field. The sun destroys the bacteria in the soil, therefore it must be covered immediately. Now that your seed bed is perfect and manure, lime and inoculated soil have been properly applied, you are ready to sow your seed August 20. Be sure to see that your seed is free from dodder and other pernicious weeds. To try its vitality place 100 seeds between blotting paper in a dish and keep moist. In two or three days you may count the percentage of germination and know the value of your seed. Use western seed from high non-irrigated lands. Apply 30 pounds per acre broadcast and harrow lightly, after which roll thoroughly. If you have a T bar roller so much the better, as it firms the soil and at the same time leaves a dust blanket, this preventing the escape of moisture. With the seed, or just before sowing it, apply to each acre the following: 150 pounds ground bone, 200 pounds acid phosphate, 50 pounds muriate of potash. This mixture of 400 pounds should be applied each year immediately after one of the cuttings and is better than using stable manure, as it adds no pernicious grass or weed seed. Furthermore in the application of manure the heavy wagons mash and injure the crowns, especially of the young plants, while the nitrogen and humus of manure can be more profitably used on other crops as alfalfa provides these for itself.

There is no more trouble in curing alfalfa than there is in curing green clover. At Haddon Farms we start the mowers just as soon as the little shoots show at the crowns. To cut before this time seriously injures the plants, especially while young, and if shoots get long enough to allow the mowers to cut them off the following crop is diminished. After the mowers, follow

immediately with the tedders to loosen up the green alfalfa. When well wilted we put it in windrows with a side-delivery rake, where it lies for two or three days. Then two windrows are rolled together with the side-delivery rake, thus exposing the alfalfa next to the ground to the sun and wind, and very soon it is rolled up, either by hand but mostly with the old dump rake and hauled to the barns. By this treatment the hay is handled almost entirely after it begins to dry with the side-delivery rake and most of the leaves are retained. Should it rain the windrows are allowed to dry out as much as possible and then the side-delivery gently turns it over again to the sun. By this method we may, if rainy, have some colored hay, but we prefer this to no leaves which often results by the continual moving and turning when capped, which is an expensive performance, often destructive to the plants where the cocks stand too long and seldom practiced on Haddon Farms.

SHEEP DEMONSTRATION

H. Noel Gibson, Millbrook, N. Y.

Sheep are apt to develop parasites where they run for a great length of time on the same land. You can run them in one place for one or two years, but after that time they are sure to become infested. However there is a cure for it. If people gave one-half as much time and attention to their sheep as they do to their dairy animals, they would not have half as much trouble. It is just as easy, and a good deal easier. There is no getting up at four o'clock in the morning, and no washing or sterilizing, or anything of that kind. All you want is a little horse sense, and you will get along. Now, I don't mean to say anything against any branch of farming, but there is no reason why the farmer should not do a little in the sheep line in connection with his other lines. Any farmer who has fifty to a hundred acres of land, should have fifteen or twenty ewes. The sheep will always deposit their manure on the highest ground, and help to fertilize the land where it is most needed, but they never lie on the low land.

The middle west is producing lambs at present, and bringing them probably two thousand miles to our markets. These lambs should be raised right here at home; there is no reason why it should not be done very easily and profitably. In fact, it is our duty to do so. If the west had any competition in the meat production, there would not be this case of boycott that there is now going on. Another point to remember, is that if the West decided to boycott the East, there would not be enough meat left in the East to carry any one of our cities for a week.

Now, we have two lambs here. They are both Shropshires from the same farm. Now, when I go to the market and look over the different lots of lambs, I want to buy a lamb that is close to the ground, with a good leg of mutton, and a good spring of ribs.

Now, of these two lambs, the larger one on my left is 350 days old, and the one on my right is 308 days old. The difference in their weight is twelve pounds. They were fed practically on the same feed. The same rule holds good in sheep as it does in beef animals—you must have a good, short leg, a good body and a good digestion. This lamb, from the killer's point of view, is a good lamb, and very well developed in the higher-priced cuts of meat—the cuts that command the most money. From the farmers' point of view, a little better conformation would be what we want.

Now I might say a few words in connection with starting the flock. In the first place, you must take your market into consideration. Right here you have a very good market for hothouse lambs, but the man who has no facilities to market them should not undertake to raise them. He should raise them to sell at from 6 to 8 months old. For this purpose I would recommend some of the Down breeds—also the Dorset would afford an excellent means for the farmer to continue his flock.

Now, in starting a flock, it is well to get ewes that are not too old. You cannot do better than to go to the West, and get some of the Western ewes. When the lambs are six to eight months old, they are ready to go to market weighing sixty to eighty pounds.

You take some of our heavy-boned sheep of the West, and put them on our light soils, and they will not do so well. Any place West of the Rockies, they will do very well.

Another point to take into consideration in starting a flock is the output of wool. While some of the best mutton sheep run a little light in wool, that can easily be overcome. This little lamb has one of the best fleeces I ever saw on a Shropshire sheep.

Now, I have told you all I know, and perhaps more than I know. Have you any questions? Perhaps I can answer them.

Dr. Hunt—What is the value of these sheep if put on the market today?

Mr. Gibson—There is very little difference in their market value. The difference would be in the profit they would make. I would take the one with the short legs and heavy body first.

A Member—Tell us how to care for sheep.

Mr. Gibson—I will start with a flock of ewes. Feed them through the season, a little grain and a little hay. You will have to use your judgment. A little oats and bran will be very good, if you have them. Then we will suppose we approach within a month of lambing time. Some of your ewes may be strong, and some may be weak. Select your weak ones and feed them a little better, until they receive a pound a day. Keep your ewes in pretty good condition, so they will have a supply of milk for the lambs when they are dropped. Many a lamb is lost because the ewe has not enough milk to feed it with. Then, when lambs come, take your ewes and confine them in a pen for two or three days, and feed them some milk-producing food, such as bran, hay, and some of the oil meals. Or, in the spring, turn them into a piece of rye. You will find it an excellent thing for them, and they like it. Leave them there for a month or six weeks, and then turn them into a field of clover. Your lambs will probably develop stomach worms there, but that can be overcome. Feed them on rape, and then you will not need to feed them any corn until you are going to market them. They will gain on rape as on no other green feed for ninety days, making a gain of forty-five pounds, and in this way you can avoid the stomach worm. Or, there are a number of preparations on the market, which I have every reason to believe will do what is claimed for them.

A Member—What sort of ewes would you buy?

Mr. Gibson—Well, in buying ewes, I would want the legs as close to the ground as I could get them planted, and with a good length of body and good spring of ribs.

A Member—What breed of lambs is it best to raise?

Mr. Gibson—That depends for what purpose they are intended, if for hot house lambs, the Dorset, probably, because it can be bred at any season of the year.

This completed the morning program, and the meeting adjourned until two o'clock P. M.

CARCASS DEMONSTRATION

Pro. S. W. Doty, State College, Pa.

SCHOOL OF VETERINARY MEDICINE

Gentlemen, we will now have a carcass demonstration, using the two lambs, one a Tunis-Dorset cross, bred by Henry Palmer, and the other, a pure-bred Shropshire, bred by our Treasurer, Mr. Lantz. These lambs were both shown on foot, and were killed yesterday. The steer that was shown on foot was also killed, and will be used by Prof. Doty this morning in demonstration. When he is through, if there are any questions, he will answer them. I have the pleasure of introducing Prof. Doty of State College.

Prof. Doty spoke as follows:

Gentlemen—This carcass demonstration, as I understand it, was to be upon the program of your meeting to give you an opportunity to study the good and bad points of the mutton and beef carcasses, and, inasmuch as these are the carcasses of the animals that were judged on foot the other day, it should show something of what is necessary in the live animal to produce the best carcasses.

We will take the mutton carcass demonstration first: The most important cuts of the lamb carcass are the leg, loin and rack, named in order of value. Formerly, the saddle, which includes the loin, was the most important cut and the leg was not considered quite as valuable, but to-day things are somewhat changed and the leg of lamb is now in greater demand than either the saddle or the rack and it is also higher-priced on most markets. The breeds that show the greatest development in the regions of the high-priced cuts are of course considered the most valuable for mutton purposes and we find this condition to a greater or less extent in any of the strictly mutton breeds of sheep. The sheep should be developed in the regions of the cheaper cut—brisket and neck for instance, only sufficiently to give symmetry of form.

Before cutting the carcass the principal thing to note are the covering, the general quality and the confirmation of the carcass. By covering we mean the amount of fat there is over the fleshing part of the carcass. We want that evenly laid on, and well distributed in a firm mediumly thick layer—not patchy. Sometimes we find a heavy layer of fat across the loins, and back or down on the sides, a condition very much objected to by butchers. Quality is indicated in the carcass by the general make-up thereof. It is also indicated by the appearance of the meat fibre and general covering.

Of the two carcasses before you, the Shropshire is a little more compact, and, perhaps, a little smoother. I think it has not quite as much leg in proportion to the size of the animal as the Tunis-Dorset, and for that reason may not be quite as valuable, but I think it shows more general quality. Both are, however, deficient in the leg. They do not carry down far enough. The Shropshire is not quite as thick as the Tunis in the lower part, along the line of the breast, where you want it to be light.

In the Tunis carcass we have the heavy tail-head which is characteristic of that breed, and it is also not quite as fat. He is somewhat roughly covered and a little thin at the shoulders. It is in fact a little coarse, and the Shropshire is not finished quite sufficiently.

The Tunis is somewhat large in the neck. That is long and heavy, while the Shropshire is somewhat more compact in this part, and therefore lighter. I would judge that the neck of this Shropshire weighs about three-quarters of a pound. which is about what we desire. The Shropshire neck is small and slopes right into the shoulder. The Tunis would have to be cut off higher up, and that is waste. To sum it up, I would say that the Shropshire carcass shows up a little the better from the butcher's standpoint.

Now, are there any questions? I am going to cut them up into wholesale cuts, making the cuts according to the Chicago methods, which I understand are somewhat different than those of Philadelphia. Before going on with the cutting, however, I might remark about the different methods of dressing. We have the back setting, as is seen in the Tunis carcass and the round dressing as is seen in the Shropshire carcass. Either is good but the latter does not show up the inside of the carcass as well. The back setting method is usually used on lambs and the round dressing on sheep.

In cutting up a lamb, they are sometimes first split in halves then, again, they are cut without splitting. When not split the entire loin makes the saddle of lamb, and the last ten ribs on each side make up the rack. If split the rack and loin are cut into chops. The first cut to make is to remove the cheap cuts, and that is done by cutting into the flank at the stifle joint here and cutting to the point of the last rib. Then we cut up to the forearm here, leaving the forearm on the point of the brisket. Now, in that cut you have the cheap meat removed. It comprises the flank, the lower part of the brisket, and the forearm. As I said before, it is desirable to have that as light as possible. In Philadelphia they have a different method of cutting both beef and mutton. I have never had occasion to see it done. The method of cutting I have shown you here is the one employed at practically all of the market centers except Philadelphia.

Now, you see in removing the shoulder in this way, you leave no ribs at all in the shoulder cut. This makes what we call a thirteen-rib Philadelphia rack. When cut the other way, we have a ten-rib rack, which we consider more desirable. The meat is tenderer as there is not so much articulation in the muscles back of the shoulders. The ten-rib rack will sell for ten cents a pound more than the thirteen-rib rack, inasmuch as it is a more desirable piece of meat. This shows the two different racks; the one known as the Chicago and New York rack, and the other as the Philadelphia rack.

This lamb (the Shropshire) is a little thinly covered over the loin, and still not objectionable. People object to an excessive amount of fat on chops.

This Shropshire shows better quality all through. It is a better grade of meat, and it also seems to have a finer grain.

The above are some of the points that will show what weight is put upon the different parts of the carcass on the various markets.

Now, gentlemen, we have here the carcass of the steer shown on foot the other day. While I did not see him on foot, I should say he was just in good feeder condition and would grade as butcher stock on the market. He has no excessive fat on any part of him, in fact not enough for the best markets. The first essential in the beef animal is the muscle or fleshing part of the animal, and then the finish of the animal consists of fat in the right places to produce the best results. Now, gentlemen, in the beef animal the cuts of high-priced meat lie along the back and hindquarters. This animal shows a thick round, but he does not carry down well enough behind. In fact, the round is not well enough developed in comparison with the forequarters. This shoulder is pretty deep down through and it lacks fleshing and finish. You can feel the shoulder bone here. Another thing; it is not thick enough through the "eye of beef" to be a desirable carcass. Now, you will notice the covering. You don't expect to get as much in some places as others, but there should be enough to cover the muscle so that it cannot be seen. From three-quarters of an inch to an inch of covering is very desirable, and it should be well distributed across the back and along the sides. Now, this animal, as I see it, would have finished up somewhat rough. The fat, for instance, is a little too thick at the butt of the loin and around the tail head. Another thing about the fat: it should be white and firm. This covering is firm enough, but it is a little too dark colored. You will notice on the score card that the quality of the fat is given certain weight.

The loin is not quite as thick through as we would like to have it, also there is not fleshing enough over the ribs. It is not thick enough to be a desirable carcass.

As I said before, there is a little too much weight down here in the brisket, which is the cheapest cut of meat. While it is not so thick in proportion to the depth, there is too much of it. We desire just enough in this region to bring out the parallelogramic conformation of the animal. Anything in excess of that is undesirable. I imagine this animal on foot gave the appearance of being too heavy in front, with the hind quarter not sufficiently thick and heavy, also it must have shown lack of finish.

Any questions?

Prof. Cochel—From the butcher's standpoint in the Philadelphia market, is this steer in the right condition?

Prof. Doty—He is not fat enough for that market, I should judge. On the other hand, an excessively fat animal is not desirable on account of there being too much waste. You want just enough fat to make a sweet, juicy tender meat. If you have too much fat, it goes to waste, and if you have not enough, you have a dry, unpalatable piece of meat.

A Member—How much does this steer weigh?

Prof. Cochel—960 pounds on foot; I think he weighs now 540, making about 53 per cent.

Mr. Doty—A good beef animal should dress out at least 58 to 60 per cent. of carcass. The dressing percentage is regulated to a great degree by the condition of the animal, the fat animal dressing out noticeably higher than the thin one. This is easily understood inasmuch as the weight of the offal remains about the same in either case, with much more weight in the fat carcass. The ability to estimate the approximate dressing of animals is necessary if a butcher expects to buy right.

Quality in the live animal is an important factor in the dressing percentage and no doubt the indications of quality were brought out when the animal was judged on foot. In the carcass, quality is indicated in more or less the same way except that we have other indications to go by. such for instance as the smoothness of the various parts and the condition of the muscle fibres.

The carcass will now be cut into the various wholesale cuts, in accordance with the Chicago methods (The Philadelphia butchers having a method of their own, with which I am not acquainted).

The carcass is first quartered by making the cut between the twelfth and thirteenth ribs. Here (in Philadelphia) all ribs are left in the front quarter. We, however, cut one rib in the hind quarter to add weight to it and to keep the loin in good shape for cutting steaks.

I would like to call your attention to the "eye" of beef. Note please, that the muscling is very thin. It should be at least 4½ to 5 inches thick through and be covered with ¾ of an inch of fat to be considered good. This cut shows up to a very good advantage, the extent of the marbling in the carcass, (by marbling we mean the intermixing of fat with the muscling fibre). This feature of marbling, of which you see very little in this carcass, regulates to a large degree the thickness of the muscling. It is a characteristic of the well-bred beef animal.

Dairy bred animals and grades usually place the fat more on the external and internal surfaces of the carcasses. Whereas the beef animal will mix the fat with the muscle fibres throughout the carcass, thus making a much more juicy and a sweeter meat.

The wholesale cuts of the fore quarter are the prime ribs, square chuck, plate, neck and arm, named in order of value. The first cut to make is to start here about 10 inches to 12 inches (depending upon the thickness of the carcass) down from the top of the carcass on the last rib and cut straight across through the lower part of the shoulder and brisket, removing the fore arm. This removes the plate and arm from the higher-priced cuts. These latter cuts being used for stews, corning or hamburger.

The next cut to make is to remove the prime ribs. This is done by cutting down between the fifth and sixth ribs, counting from the front, thus leaving the back seven ribs of the front quarter in one piece, as you see here. This is one of the most valuable cuts in the carcass and is used for roasts almost entirely. The roasts from this cut are used as standing, folded or rolled, as the case may be.

Next remove the neck from the square chuck. It is a cheap cut and is used for corning or hamburger. The square chuck may be cut into the following—cross ribs, chuck ribs and shoulder piece.

The hind quarter is made up of the loin, rump and round. We first place the hind quarter on the block with the inside up and strip out the kidney fat.

Also remove the flank by cutting from the stifle joint to the point of the rib or a few inches above, depending upon the thickness thereof. Then we turn the quarter over and remove the loin from the round by making the cut from the rise in the pelvic arch down to the stifle joint. This cut should strike the edge of the hip joint if properly made, just as you see here.

The loin is the most valuable piece of the carcass and is usually used as steaks. The steaks of the loin are spoken of as follows; the hip bone sirloin coming from the butt end, the wedge bone sirloin coming next and the "T" bone or porterhouse steaks from the front end of the loin.

The rump is removed from the round by cutting across under the pelvic arch. It is used as roasts principally and is a very desirable piece of meat. Following down on the round and cutting parallel to the above cut the round steaks are obtained as shown in this cut.

A Member—Where does the pin bone steak come in?

Prof. Doty—That is a cut I am not familiar with.

A Member—In the Philadelphia market we have what we call a pine-bone steak. It is made by cutting right along here. You follow the sirloin in the hip bone.

Prof. Doty—This gentleman will show you the Philadelphia method of cutting; I am not familiar with it.

After the gentleman from Philadelphia had shown the Philadelphia method of cutting, the Association passed into the court yard to see the awarding of prizes to the horses.

DAIRY CATTLE JUDGING DEMONSTRATION

Prof. H. E. Van Norman, State College, Pa.

Thursday, February 3, 1910, 10 o'clock A.M.

Mr. Perham in the Chair.

The President—The meeting will please come to order. Prof. VanNorman will now give us a Demonstration on judging Dairy Cattle.

In taking up this subject, we are looking for the outward signs of inward ability. The man who is judging a beef steer is judging him for what he is, while a man who is judging a dairy cow, is judging her for what she can do. It is very much harder to judge an animal for what it can do, than for what it is. Fortunately for us, Nature has certain laws, and in so far as we know these laws, we can take advantage of them. The fact that we don't know these laws does not excuse us when we make mistakes.

We are trying to find out what Nature's signs of ability to produce are and whatever I may say to you is based largely upon observation—a sort of a summary of the judgment of experienced men. I cannot give you figures to prove them. or substantiate many of the statements I may make. The data we have has been taken from the production of a large number of cows, whose records have been kept from year to year. When we compare them with the conformation of the animal, we find certain effects upon which to base our judgment. What I am trying to give you this morning, is my opinion based on these facts. I have had passed around a "score card", so-called, which we use at College. This is not an end, but simply a means to an end, and that is, a tool to teach our students to be better judges of dairy cows, and to read the signs properly; we have arranged them in something like systematic order, because the man who is systematic in his efforts, is apt to be more successful.

I went into the barn of a man who was very successful, and I asked him "how do you pick out a good dairy cow?" He said, "I don't know; you college fellows are always asking such fool questions. I just look at her, and if I like her, I take her." Other men will have signs; one will look at the hole in her shoulder, and another will have some other little fancy point. There may be no relation between these points and the ability of the cow, but when we go over the cow as a whole, we find some common points in all good dairy cows. They do not always pan out right. Sometimes we find a cow that seems to have all our points, and yet she goes wrong. It is just like the bank presidents whom we trust, but occasionally one goes wrong.

As a rule you do not find in the same animal large meat making ability and large milk producing ability. Governor Hoard calls it a matter of temperament—the inward tendency to go to milk or meat.

A good dairy cow should never get fat when she is in milk. It is her temperament to turn her feed into milk. Now, things are comparative in this world. We measure distance by comparing with the yard stick. We will measure cows by comparing one with another. So we do not so much need to learn what constitutes a perfect cow, as what we shall avoid in looking for a good dairy cow.

We have two cows here, representing two different breeds. I believe that we are getting more and more to the same type in our leading dairy breeds. Why? Because Nature seems to have associated a certain shape with performance, and the closer we come to this conformation, the more nearly sure we are of our production. We talk about the Dairy Shorthorns of England. That is simply a meat cow with a dairy conformation.

Beginning with the head, the first point that you will find on the card, is the muzzle and nostril. We want a large opening in the nostril, because constitution is a point of vital importance, and the cow that is doing an immense amount of work has to have an immense amount of fresh air, and we want a large opening to enable her to take in that air. We want a good, strong lip, because strength of lip suggests strong digestion.

Looking at the face, we want it to be clean cut, because even in the structure of her face, the dairy cow wants to be free from the meatiness. A clean cut face makes for intelligence, and we want an intelligent cow. We want her dished in the face. I don't know why, but the best dairy cows have this feature. Then, we want a prominent eye, a bright eye, a mild eye. There is a great difference in eyes. Some men have reduced this ability to read the signs almost to a science. One man whom I know, and he is a man of national reputation as a cow man, says he can judge a cow if he can simply see her eye. Most of us cannot do that, but still it is true that the eye is an important sign—whether it suggests a mild disposition, or a nervous disposition; whether it suggests strength or weakness.

The ears, and the horn we want reasonably fine. You get a cow with a large, coarse ear, and a large coarse horn, and a general masculine contour, and you have a beef animal. The dairy cow's chief duty, milk making, is a function of motherhood, therefore we want her feminine. When it comes to the neck, the same thing holds true. You want a strong, thin, short neck. Why? As Abraham Lincoln said "as long as a man's legs are long enough to reach the ground, that is all that is necessary", and so long as a cow's neck is long enough to reach to her shoulders, that is all that is necessary. But, "handsome is as handsome does", and it is not only beauty but ability too, that we are looking for. We want a reasonable neck—not a thick neck, because that makes for beef again.

Now, working back, we want her thin over the shoulders. I don't know why, except that in examining the records of a thousand cows, the best producers were all narrow across the shoulders. That narrowness which is brought about by the spinal column coming up above the shoulder blades, and by the absence of meatiness.

Then we want the shoulder points wide apart, because it gives greater lung capacity; a cow that is eating fifty pounds of silage a day, and, in addition, eating her hay and drinking her water, must have ability to digest it. The dairy cow must be wedge-shaped, narrow across the withers, wide at the shoulder points and across the hips, deeper from the loin down than through the heart, with a large belly.

We want the back straight. Some one says it does not make much difference whether the back is straight or crooked. Well, a straight back is suggestive of a strong spinal column, strong bones, strong nerves, and a strong nervous system. A cow drinks, often, a hundred to a hundred and fifty pounds of water at one time. Add to this her fifty pounds of silage, and she has a great amount of weight to carry. If in calf, she has additional weight to carry, and a strong back gives her ability to carry it. The back is made up of a number of little bones, and these spinal processes are separate. In this cow they are close together, but in the Holstein they are more open, and what might be considered a loose back in the Jersey or Guernsey, would be a very close back in the Holstein.

Then we come to the loin, which should be strong and well developed. I like to see the hips wide and prominent, and I want to see them sharp and clean cut. If you will take a beef cow that is thin, and examine her, and take a dairy cow that is thin, and examine her, I think you will find that the beef cow has a rounder bone, while the dairy cow has a more angular bone. Therefore I like to see that bone angular. In this cow you can get almost a triangle. You want a prominent shoulder bone in the same way.

I think the Ayrshire has the habit of carrying more flesh than the other dairy breeds, so we must be careful and not allow the flesh to deceive us.

Now comes the rib. I did not hear Mr. Cochel yesterday, but I can pretty nearly imagine that he told you a good beef animal wants to carry out straight here. The dairy cow is different. When we look at some of those productive animals that you and I have seen at the International Live Stock Shows, we can pretty soon tell the difference. In the dairy cow we don't want the straight rib. It should not start at the spinal cord and run out straight. It should have a curve, and when it comes from the lung, it should curve very perceptibly. We rarely find a cow lacking in that and yet is a good producer. Occasionally we find a cow lacking depth, but of greater length. What she lacks in depth, she makes up in length, but as a rule, we want her deep, rather than long. Another thing, the ribs of the dairy cow slope back, rather than run down straight. In the dairy cow we want them wide apart. In this cow there is room for three fingers between her ribs. The Ayrshire is a little more closely knit than some of the others. The bone of the rib should be flat. An old cattle buyer that I ran across placed a great deal of stress on this one detail. He would walk up to a cow and feel her ribs, and if they were round, he would say "No; she will take care of herself." That is, her first tendency in feeding would be for maintenance, while in a good dairy cow, her first tendency is for milk.

Going back to the rump, we want good width here, with the bone pushing out like this, so as to leave room for the maternal function. Then, we want a good length from hips to pin bones; I don't know why, but it seems to be a fact. Again, on this pinbone, we want the same sharpness that we spoke of in the hipbone. Next, we want a strong tail; not coarse, but long with a good brush, because it makes for production. There is a channel there through which the spinal cord is carried out into the tail. Great stress is laid by some breeders upon the length of the tail. They want it to run down to the hocks, claiming it is an evidence of productivity. Personally I do not believe much in it, but in judging cows, it is well that there should be as many good points as possible, so that this length of tail is a desirable thing to have along with the rest.

Next comes the ham or thigh. It comes up in-curving in the dairy cow. Why? Because when it out-curves, it suggests beefiness.

Then this flank; we like to see it come up pretty well. I don't know why, but it is so in the best dairy cows. Then, coming to the udder, it is the machine, the organ, that turns the feed that was given to the dairy cow, into milk. If you have a cow that normally gives fifty pounds, or forty, or thirty-five pounds of milk and kill her you won't find that much milk, as we know it, in the udder is not in her udder, nor does it exist in any other part of her body as milk. This udder is, therefore, a marvellous organ, composed of tissue and cells, with power to take from the blood, and in some mysterious manner, transform it into milk, which operation is completed while she is being milked. It is full of nerves and secreting tissue, with enough muscle to support it. As this is the place the milk is made, we want just as much of it as the cow will support.

The legs should stand rather wide apart, with plenty of room between them for the milk machine. The udder should be covered with a soft, fine skin. You should see the veins, as you do in high bred trotting horses. One of the strongest characteristics of the Ayrshire is the strong udder, carried well forward, while one of the most prominent characteristics of the Holstein is the lack of fore udder. It seems to be a characteristic of the Holstein to have what we would call "the pendant udder", while the Ayrshire carries forward to a marked degree. The teats should be well developed and squarely placed, fairly wide apart, and long enough for convenience in milking.

The front quarters should not be higher than the hind quarters, but it is difficult to get them that way.

Then come the milk veins. That seems to be one of the contradicitions of bovine nature. They have no milk in them, and do not bring any milk from the heart to the udder, but rather carry blood from the udder to the heart. As a matter of fact, from the heart there is a large artery running through here, entering the udder where it starts, and then coming back to this vein, and from there back to the heart. Now, if the udder is making the milk out of the blood, we want lots of blood coming to it, therefore, we look for a large milk vein as an indication of a large amount of blood passing through the udder. We not only ask that the vein shall be large, but that it shall be crooked. Run your hand over this cow gently, and see how very large this vein is, and it is also very crooked. Students of animal anatomy tell us that wherever you find veins and arteries carrying large amounts of blood, you will also find them crooked. Coming to the hole through the wall of the abdomen, we want this well developed because it does not profit us to have a large vein if we have only a small opening through the wall. Some cows make up for a rather small milk vein, by having two or more of them. On this Holstein I find it strong. The Ayrshire has a particularly small vein, and if you will notice, on this cow you will find that it is very far back. In some cows they are within four or five inches of the shoulder.

The next and last point in the conformation is the legs. Personally I do not pay so much attention to this. The cow has to have legs enough to carry her, and we don't want them hocked too much, or coarse, we want them to be fine, in relation with the rest of the body.

Now comes the skin. To a cattle man, the skin is an important sign of the inherent quality and condition of the cow. A cow may be so out of condition as to show a hard, coarse skin. The skin is a sign of physical condition. You don't want it too thin, but not many cows have a skin that is too thin. You want a soft, mellow skin. The finest skin I ever saw was on a big Holstein bull. I have forgotten his name.but his skin was very soft and mellow. The skin is also an indication of the feeders' skill, and the softness or hardness of the skin is also an indication of the physical condition of the animal.

We have been going over this animal, and we want to sum up some of the conclusions we may draw from it. First, the cow should be wedged-shaped; square here, thin over the shoulder joint, wide here, and over the withers. When we look at her from behind, she is a little narrow in the hock. Excessive narrowness is not desirable. Then another most important point is the side wedge, the thickness of this portion (loin down) as compared with this (through the heart). Some people make the mistake of thinking that we want this front depth shorter than the hind depth. I would state it the other way. We want the hind depth greater than the front depth. A distinction without a difference, probably, but we want all the depth we can get here in front, and then a little more behind. It makes for feeding capacity. The cow cannot

take a large amount of feed unless she can handle it, and the ability of a cow to produce milk depends largely upon the amount of food she is able to digest. Occasionally you will find a little cow that is all right, but as a milk producer, I would rather have a cow with large digestive capacity.

I made some interesting experiments a few years ago. I went into a herd where there were over nine hundred records, and picked out every animal which had made over 6500 pounds of milk a year, for three years or more. Then I went over it and found those that had made less than 5500 pounds. Then I went to the herdsman, and had him go with me and pick out the twenty-five cows that had a record of over 6500 pounds for more than three years, and without exception, every one of those cows had this conformation—wedge-shaped, deep here, and deep through the chest and bone, angular in type.

I don't want to advertise any particular breed, but Schreiber's pictures of Hay's Rosy and France VIII, are magnificent specimens of the dairy type. Now, if you go over the pictures of the record cows in the agricultural press, you will find that they approach very closely to this type of cow. As I said before, the shape of body in the different dairy breeds is getting closer and closer to a common type. True, there is a difference in the color of the hair in the Holstein and the Ayrshire and the Jersey, but taking it all in all, the shape is very similar in the good cows of the two breeds.

Coming to the last point, the temperament: that is a hard thing to read. It is the thing that distinguishes the beef cow from the dairy cow. It is the sand, the nerve that makes the little horse pull more than the big horse. Some of you may have played football, and you know that at the very last, one man may be able to put in an extra spurt. We see two men go into the game, and one has the nerve, the temperament, to enable him to put in a last winning effort, even when he seemed to be doing his very best before. It is not necessarily nervous excitability, but the ability to put the final energy into a thing and make it a success. Take this cow, here, standing here and chewing her cud, and see how contented she is in here, with all these people around her. Part of that is education, because you can educate cows, as well as educate boys. Part of it is temperament. If I read her right, if she went into a fight with a dog that worried her, she would come out the winner, and we want a cow that will go into her feed in just the same way. It is the same spirit we see in the man who, when he was sick, said he wouldn't die; he would get well; and he did get well because he refused to die. That is the disposition you want in a dairy cow. Size does not count so much as the other qualities.

You can form your ideal of a dairy cow, and then when you find her, put her in your herd, and you will soon have a profitable herd. I went into a little herd some time ago, and it was a pleasure to see it. Whoever selected it had an eye to type, to that uniformity which makes for beauty and indicated skill of the true cattle man.

Then you want a good sire. You want him for his ability to transmit to his daughters the good qualities he inherited from his mother. In selecting a sire, you want to go back to his mother, and get the record of her ability and temperament and productivity.

Do you know what it cost you to produce a hundred pounds of milk last week? Do you know what it cost you to actually feed your cow last week? Did you know what each cow actually brought you? Five cows may make a profit of a hundred dollars, and yet one cow take ten dollars more feed than the others. We might eliminate her and still have a hundred dollars profit. Another cow may just pay for herself, and you might eliminate her, and still have your hundred dollars profit on the three cows. In order to make money in the milk business, a man must study his herd, and each cow in his herd, and he must keep a record of her cost and production. If he does not, he will have to get out of the milk business sooner or later. Now, are you willing to pay the price, what is it? It is study—the study of your cows—the study of your methods, the study of your figures. The time has come when it is necessary to combine book farming and practical work if you want to succeed.

Mr. Keim—Is there any way in which we can judge our calves when we are raising them any more than a general outline?

Prof. Van Norman—Well, it is pretty hard to judge a calf, but in a general way you want the same type in the calf as in the cow.

One thing more about a good bull. If three or four men would agree to go out and each get a good two-year-old bull and then exchange with each other every two years they would in that way each have a good bull for six years at the cost of one bull.

Now I suppose we will have to close this demonstration without any discussion. There is a sheep demonstration outside, which most of you will want to see.

HOW CAN WE IMPROVE OUR CORN?

Prof. F. D. Gardner, State College, Pa.

Friday, February 4, 1910, 2 o'clock P. M.

The first event of the afternoon was the auction of the prize corn, followed by the sale of the apples exhibited by the Pennsylvania Horticultural Association. The Champion ten ears of Improved Leaming were sold to Vance McCormick of Harrisburg for $16; the second prize lot, of the same variety to Dr. Adams for $7, and the third prize, same variety, to Dr. Gilliland for $15. The Grand Champion Ear of Boone County White went to Dr. Marshall for $7; the first prize ten ears same variety, to Henry Fielden for $6; second prize, same variety, to J. E. Dodge for $10; third prize, same variety, to L. B.

Hansen for $6. First prize Ninety Day corn went to Dr. Marshall for $11; second prize to Dr. Adams for $5.

After the auction, President Norton took the Chair.

The President—Gentlemen, you will please come to order, and we will take up the discussion of "How Can We Improve Our Corn?", to be led by Prof. Gardner. I have the pleasure of introducing Prof. Gardner.

Prof. Gardner opened the discussion as follows:

Mr. Chairman and Gentlemen—I am very glad that this is to be a discussion, and that you are to take part in it. I am not here to do all the talking; simply to lead the discussion. I am always willing to advocate anything that will improve our corn, and give the farmer an increased yield and a larger financial return.

There is a great deal that can be done, it is true, by building up the soil, by the better preparation of the seed bed and by the rational use of manure and fertilizer, but I want to speak today more especially of the improvement of the corn itself by selection and breeding. All realize the value and importance of good breeding in live stock, and I want to say to you that the same principles apply in the breeding of both animals and plants. It is just as important to have well-bred and well-selected seed corn as it is to have well-bred and well-selected animals.

In the selection and breeding of corn, it is well to use only the varieties and strains that yield well. In the selection of seed corn we should always look for the ears growing on good stalks—and accept only those that have their desirable characteristics well marked. For instance, you will note that this Champion ear is not only a large ear, but it is different in regard to the character of kernel than the 10 ears exhibited from the same lot of corn. I will venture to pronounce this ear a sport, and the man who exhibited it discovered something worth while. I hope that the man who bought it will have it tested and compare its progeny with that of other ears, in order that he may report results another year.

After you have discovered something that promises to be of value, the first thing to do is to find out if it really has value.

When in search of an animal as a sire, there are three things to take into consideration. First, the pedigree of the animal; second, his appearance, and third, if possible his performance. The same three things apply to corn. You can tell whether it is fine looking or not but you cannot tell by appearance what the performance of the seed will be. How are you going to find out? Simply by planting by the ear row method—each ear planted in a row by itself, so that you can ascertain if it will give a big yield of a good quality of corn. In a corn show you cannot know that; all you can know is that it looks well. If you have twenty or thirty ears of fine seed corn, plant each ear in a row by itself and see whether certain rows give you a better production than others. Then, in harvesting, you should harvest each row by itself, keep the corn separate and select your seed from a few of the rows that promise best.

I was very much interested in a little slip of paper which you saw in the corn exhibit, explaining ten exhibits of three ears each. Those ears represent the product from each of ten ears exhibited last year. Each ear was planted in a row by itself and the yield of corn from each ranged all the way from five and a half bushels for the lowest to eight bushels for the highest. This variation was undoubtedly due to the inherent power of those ears to produce, and it is up to the grower to select seed for his next year's crop from the rows that produced best.

The ear-row method of planting corn gives the greatest chance for rapid improvement. It not only enables the grower to increase the inherent yielding power of the corn but enables him to change other characters such as height of stalk, position of ears or time of maturity. Corn that is too late for a certain locality may be made to mature earlier by selecting seed from the early maturing stalks. Out in Illinois by using the ear-row method of breeding corn in experiments extending over ten or twelve years, they have changed the composition of the corn, increasing the protein, and fat in one strain and decreasing it in another.

A Member—Can you increase the protein very much without decreasing the yield?

Prof. Gardner—Yes, it is possible to do so, but in this case there was a small decrease in yield. That is something you must look out for. Breeding for the greatest possible development of one character often results in a deterioration of others.

A Member—What is the difference between the highest and lowest protein?

Prof. Gardner—Nearly double, and becoming greater each year.

I don't want to make much of a talk; I believe we can get more out of it by having sort of an experience meeting.

A Member—How far apart are the experimental rows?

Prof. Gardner—Just as far apart as the others.

A Member—Has the pollen mixed?

Prof. Gardner—Corn is naturally a cross pollinated plant. A man starting with one ear does to at a disadvantage, because the resulting stalks are all from one mother plant; they are closely related and the result is injurious. When ears are planted in separate rows it is desirable to detassel alternating rows and select seed ears only from the detasseled rows. All kernels on such ears are the result of cross pollination.

A Member—In planting seed corn, is it not a good idea to get an ear as near to the ground as possible?

Prof. Gardner—I advocate having nodes as close together as possible. At each node a leaf is produced and the leaves are to the plant what the boiler is to the steam engine. They are the lungs of the plant, and the more leaf surface you have, the greater the power of the plant to manufacture corn. Furthermore, the leaves are the most palatable and nutritious part of the stalk when used as forage.

A Member—Is it desirable, as a rule, to have suckers on the stalks?

Prof. Gardner—Not as a rule.

A Member—Does the position of the ear on the stalk have anything to do with the length of time it takes it to ripen?

Prof. Gardner—Not especially. If the ear is high, there is generally more stalk, and the chances are that it will ripen a little later than the low ear, although this does not necessarily follow.

A Member—To what extent does detasseling increase the production per acre, and is it of greater advantage to detassel every other row rather than every other hill?

Prof. Gardner—Quite a number of experiments have been tried along this line; in some of them there was a slight increase in yield, while in others there was a little reduction. On the average there was no material difference the first year. Theoretically the progeny of the detasseled rows would be the more productive.

A Member—Would it be to advantage to de-tassel every other hill or every other row?

Prof. Gardner—So far as the immediate effect is concerned I don't know that it would make any material difference; it would be more convenient to de-tassel every other row. I might say that in our breeding plat each row is planted from a separate ear.

A Member—Is there any advantage in de-tasseling every hill in a row, or would it be better to de-tassel every other hill, in the preparation for seed corn?

Prof. Gardner—It would be better to detassel the whole row; because if you detassel but one hill, and leave the one next to it, the de-tasseled hill will receive pollen from the next hill in the same row. All plants in any row are closely related, being from the same mother plant and it is to avoid close pollination that we resort to de-tasseling alternating rows.

A Member—Is it better to pull the tassel out, or to cut it out?

Prof. Gardner—It can be pulled with less injury, if done at the right time, than if it is cut out. In cutting you will be apt to injure the leaves, and make a worse wound than if you pulled it out at the proper time.

A Member—You could not de-tassel six rows, and then leave six rows?

Prof. Gardner—I have not seen it tried. If satisfactory pollination would result, it would facilitate harvesting when the whole plant is harvested. I have seen good results where they de-tasseled two rows and left two, and I also know of an instance where they de-tasseled two rows and left one.

A Member—If we could de-tassel four, that would be sufficient?

Prof. Gardner—Yes; that would facilitate the cutting and shocking of the corn.

A Member—How do you make the seed test for the yield of the corn?

Prof. Gardner—Well, we usually do it when the corn is standing. This year at State College we cut and shocked each row by itself, but that would be somewhat impracticable for the farmer.

A Member—You just worked it out on small plots?

Prof. Gardner—No; it was in a small field, with rows three or four hundred feet long.

A Member—You just worked as much as you wanted to use for seed in that way?

Prof. Gardner—Yes.

A Member—If two distinct varieties are planted side by side, say a long-grained variety in one row, and a short-grained variety in the other, which would predominate in the crossing?

Prof. Gardner—I do not think there would be any marked difference the first year..

A Member—In other words, if you detasseled the long-grained variety, how much influence would the short-grained variety have on it the following year, if you used it for seed?

Prof. Gardner—Probably about one-half of it would be medium, one-quarter short grained, and one-quarter long grained.

A Member—What would be your procedure, then, if your corn showed a tendency toward a short grain, thus producing a deficiency in kernel?

Prof. Gardner—I would increase the depth of kernels by selection and breeding or secure seed of a new strain that would meet my ideals in this particular. It would not be wise to attempt the desired improvement by crossing two varieties that differ greatly.

A Member—What would be the result of a violent mating?

Prof. Gardner—It would be rather disappointing; you would secure a rather small percentage of desirable types and it would take several years of selection to fix the character which you might desire.

A Member—What could you do the second year to make it come true?

Prof. Gardner—You have a cross between a very shallow grained variety and a very deep one. The result would be a limited number of deep grained desirable ears. In order to fix the new type you will have to select and plant by the ear-row method, selecting the seed ears from the rows, the product of which most nearly conforms to the desired type. In this way it will take several years to accomplish the desired results.

A Member—You would have to de-tassel the short variety, or the long variety?

Prof. Gardner—You would now have a new variety, which it would take several years to perfect.

A Member—In selecting these, you would put two rows side by side, and select them the same way?

Prof. Gardner—No; I would plant by the ear-row method, isolating the seed patch as far as possible. so as to avoid outside pollination. I would then select my seed from those rows that produce kernels desirable in depth. I would continue the selection and breeding in this manner until the desired result could be secured.

A Member—In de-tasseling, does it have any bearing on the size and quality of the fodder, as well as on the ear?

Prof. Gardner—Not that I know of.

A Member—For instance, the fodder of one variety is very long and that of another is very short; do you know whether the male or female predominates in that case?

Prof. Gardner—Neither predominates so far as we know.

A Member—Suppose a man has alongside of good corn, one row of an other variety from which he wishes to select seed, is it best to de-tassel the row that has been planted alone, or to let it fertilize the other corn.

Prof. Gardner—The first is correct, if you have only this one row to select from. The effect from the pollination of this one row on the field would be very slight because it is only one row in many.

A Member—Which corn would predominate?

Prof. Gardner—The immediate product from the individual row of corn would not differ materially from the seed, but the progeny of this would be intermediate between the two varieties.

A Member—Which has the greatest feed value, and which will produce the greatest number of bushels—the white or the yellow corn?

Prof. Gardner—We have made a great many experiments on that, and there is no material difference. In the North we grow the yellow corn more extensively and on an average it will outyield the white. In the South, the white will outyield the yellow. When we take the average of the two sections, there is practically no difference in the yield. Chemical analyses of many samples shows the average composition of the white and yellow to be identical.

A Member—Professor, do you mean to say you cannot select ten ears here that would be representative of the production of that corn?

Prof. Gardner—Yes; you cannot tell by looking at it whether it will yield thirty or fifty bushels to the acre.

A Member—But would it not be fair to assume that corn that will produce deep grains on the cob, will produce deep grains in the field?

Prof. Gardner—Oh, yes.

A Member—But the deep grain will produce a greater amount of kernels and a smaller amount of cob, will it not?

Prof. Gardner—That does not represent the production per acre. A man might produce eighty bushels of the shallow grained variety against seventy of the other. If you will look at our score card, however, you will find that we allow for the corn rather than the cob.

A Member—What is there about self-pollinization? That is the principle upon which our best cattle breeding is being conducted. If you want to perpetuate a strain, it seems to me that advantage should be taken of this principle.

Prof. Gardner—If it did not happen to be corn, you could probably do it. With any plant there is self-fertilized you could do it, but corn is strictly a cross-fertilized plant. A number of experiments testing the effect of self fertilization in corn show conclusively that is very injurious.

A Member—Let me give you an example: The Spaniards brought the Andalusian horse over into Mexico. The escaped horses from them inter-bred and produced the Broncho, and there is no tougher horse than the Broncho. These stallions bred to their own daughters, to "their sisters, their cousins, and their aunts", and the result is that there is no tougher horse today than this Broncho.

Prof. Gardner—But you can also carry that principle to such an extent in breeding live stock so as to produce a weak animal.

A Member—It is a case of the survival of the fittest.

Prof. Gardner—But that may be carried too far.

A Member—While in corn, it is the desire of the grower to have the greatest possible depth of grain with the smallest amount of cob, is it not possible that this may be carried to extremes? Is there not a greater feeding value to the cob than is supposed, ninety-nine times out of a hundred? I don't recall the feeding value of the cob, but I believe it is larger than is generally supposed.

Prof. Gardner—It is very low; but we don't want the cob too small. We want the diameter of the cob to equal one-half the diameter of the ear. We want a cob big enough to hold all the grain that the plant is capable of developing.

A Member—Do you think you can produce two ears to the stalk without losing any of the food value, or losing the value of the ear in fertility?

Prof. Gardner—Well, it is possible to produce two ears to the stalk by simply selecting. As to the second part, I don't know that I quite understand what you have reference to.

A Member—Whether it is possible to produce two perfect ears without loss of value in one of those ears from the quality of the fodder?

Prof. Gardner—I don't believe that makes much difference. The one ear stalk is probably better than the two ear stalk. The two ear stalk produces a relatively smaller ear.

A Member—But if you could produce a two ear stalk, could you not increase the fertility, so as to make the two ear stalk of the same value as the one ear stalk?

Prof. Gardner—That is a very pretty theory, but I don't know.

A Member—Now, we must object to this small grain because it is too hard for the horses to chew it. I want to know whether it is not a waste of material to feed it to horses at all?

Prof. Gardner—That is out of my line.

,A Member—Where can we find a score card?

Prof. Gardner—It was given in last year's report.

A Member—What is your advice regarding the cultivation of corn after it has tasseled?

Prof. Gardner—In very dry seasons I have known cases where it was of very great benefit to give shallow cultivation even after the tasseling period.

A Member—Up in Monroe County, where I farm, I planted a field half in yellow corn, and half in a deep red, and when I came to harvest it I found a number of ears of a peculiar bronze shade, which is, I think, the most perfect corn I have ever seen. I have kept these bronze ears for seed. Now, in planting, do you think they will come true?

Prof. Gardner—The larger part of it will probably revert back, but by selecting in this way for some years, you will probably be able to fix that characteristic.

A Member—Will the corn growing in the tassel produce the same kind of corn?

Prof. Gardner—Yes; the corn growing in the tassel was probably the original form of corn. The occasional occurence of corn in the tassel is probably a reversion to the original type.

The President—We will now take a few minutes to hear the report of the Committee on Resolutions. Prof. VanNorman will have to return to the other meeting.

Prof. VanNorman thereupon read the following Resolutions, which were adopted by the Association unanimously, section by section, in the regular way:

REPORT OF THE COMMITTEE ON RESOLUTIONS

WHEREAS: A new form of milk contest, designated as "canned milk" was introduced at this meeting, and

WHEREAS: Dr. Jos. F. Neff, Director of Public Health and Chief Milk Inspector David Clegg, and their assistants, gave most valuable aid in collecting the samples, and making the contest an unqualified success, be it

RESOLVED: That a vote of thanks be extended to these gentlemen by this organization for their services.

WHEREAS: The Milk Exchange of the City of Philadelphia has rendered most valuable assistance and co-operation at this meeting, and

WHEREAS: They arranged for a milk contest among the patrons shipping milk to Philadelphia, and offered a hundred dollars in prizes to encourage dairymen to exhibit, be it

RESOLVED: That the members of the Dairy Union tender their thanks to this organization, which is doing such valuable work in this city.

RESOLVED: That the members of the Dairy Union tender their thanks to all the speakers at this meeting, to the local press, and all others who helped to make this meeting in Philadelphia one of the best, if not the best, in its history.

WHEREAS: The Dairy Division of the United States Department of Agriculture has rendered valuable assistance at our meeting by sending Mr. B. D. White and Mr. Helman Rabild to address our meeting and score the milk,

RESOLVED: That we hereby tender our thanks to the Secretary of Agriculture for the valuable assistance offered by these men.

WHEREAS: Dr. Louis A. Klein, Dean of the School of Veterinary Medicine, University of Pennsylvania, and Doctors Marshall, Gay, and their colleagues, through their valuable assistance and co-operation, made possible the live stock exhibits and helped to make our meeting a success, be it.

RESOLVED, That the thanks of the Association be extended to these gentlemen for their most excellent work.

WHEREAS: Dr. H. C. Campbell gave most valuable assistance in the milk con test by the chemical and bacteriological examinations of it, be it

RESOLVED: That we extend a vote of thanks to him for his most valuable services. And be it further.

RESOLVED: That the thanks of this Association be extended to Dr. Thomas F. Hunt and Prof. Gardner of the State College for judging the corn; to Mr. J. B. McLaughlin, of Columbus, Ohio, and Mr. R. Penn Smith of Strafford, for judging the horses.

WHEREAS: The public is becoming educated to the relation between unhealthy cattle and unwholesome milk, and

WHEREAS: Cattle breeders and milk producers are beginning to realize that tuberculosis in their herds lessens materially their profits, and

WHEREAS: The present conditions relating to the control of tuberculin testing, the indemnity for loss on cattle slaughtered to prevent the spreading of tuberculosis and the prevention of the sale of unwholesome milk, are incomplete because of changes in conditions, and the appropriations made heretofore for carrying into effect these provisions have been insufficient, and

WHEREAS: Legislation on these subjects requires most careful consideration in order that cattle owners may not be subjected to irreparable loss; that the funds of the State may be spent to full advantage, and that the public may be adequately protected from the sale of unwholesome milk, be it

RESOLVED: That the Pennsylvania Dairy Union appoints a committee of three and that it requests the appointment of a similar committee by the Pennsylvania Live Stock Breeders' Association, the Pennsylvania State Veterinary Medical Association, and the State Medical Association, and that these committees act jointly and in conjunction with the State Live Stock Sanitary Board and recommend to the Legislature suitable and adequate legislation relating to the control of tuberculin testing, sufficient indemnity for cattle slaughtered to prevent the spreading of tuberculosis and the prevention of the sale of unwholesome milk, and that upon the passage of this Resolution, the Secretary shall send a copy of the same to the Secretary of each Association named herein.

WHEREAS: The fraudulent sale of oleomargarine is a serious menace to the legitimate market for honest butter, and

WHEREAS, Present laws have proved inadequate to prevent fraud, therefore be it

RESOLVED: That this Association urge its members, and all engaged in the dairy industry to aggressive action in support of the National Dairy Union in its fight against the fraudulent sale of oleo.

(Signed) H. E. VANNORMAN,
DR. CHAS. M. SETTZER,
C. B. LANE,
J. E. DODGE,
THOMAS SHARPLESS.

This report was followed by the report of the Auditing Committee, who reported the following account of the Treasurer to be correct:

TREASURER'S REPORT

Mr. Lantz—This report gives our receipts for the year, and of this meeting to date, but it does not include the expenses of this meeting. I will be here after the meeting has adjourned, to receive any further dues that the members may wish to pay.

The President—We might as well finish the reports of the Committees while we are at it. Is the Committee on Nominations ready to report?

Mr. W. W. Blake Arkcoll, Chairman of the Commitee on Nominations, made the following report:

Gentlemen, your Committee makes the following nominations to fill the different offices:

President...Hon. W. C. Norton, Waymart
Vice-President,
Dr. S. H. Gilliland, Harrisburg
Second Vice-President,
M. P. Shoemaker, Greensburg
Secretary..........E. S. Bayard, Pittsburg
Treasurer..........J. F. Lantz, Wyebrooke

EXECUTIVE COMMITTEE.

Dr. C. T. Marshall	Philadelphia
W. S. Powell	Shadeland
M. N. Clark	Claridge
D. W. App	Selinsgrove
James Blair	Hartstown
Henry Palmer	Avondale
James E. Dodge	Narbeth

LEGISLATIVE COMMITTEE.

W. C. Norton	Waymart
E. S. Bayard	Pittsburg
Dr. C. W. Gay	Philadelphia
Dr. Thomas Turbnull	Allegheny
H. W. Comfort	Fallsington
T. G. Dain	Frazer
J. H. Reichert	Scranton
W. E. Perham	Niagara

TRANSPORTATION COMMITTEE.

T. D. Harman	Pittsburg
D. Chester Morris	Philadelphia
W. F. Shrum	Adamsburg
F. W. Levis	Chadds' Ford
John W. Oakey	Bryn Mawr
M. E. Herber	———

COMMITTEE ON STATE FAIR AND FAIRS.

W. W. Blake Arkcoll	Paoli
E. S. Bayard	Pittsburg
W. C. Black	Mercer
James Blair	Hartstown
Joe Henderson	Burgettstown
Dr. C. W. Gay	Philadelphia

(Signed) R. L. MUNCE,
DR. C. W. GAY,
W. W. BLAKE ARKCOLL.

On motion, duly seconded and regularly carried, the gentlemen recommended by the committee to fill the various offices, were unanimously elected.

The President—Gentlemen, I thank you for electing me President again. I have served nine years, and it is certainly a satisfaction to me to be elected again. I appreciate your kindness; it shows that you have confidence in me. I will do the best I can for the organization, but I must have your help. No one man can make this organization a success, but with the help of every one of you it can be done. We want every one here to become one of our number. In numbers there is strength, and then when we go before the Legislature to demand anything from them, we will get it. No one man can get anything from the Legislature of this State; we must present strength.

This Association was organized for the purpose of securing a State Fair. As you are aware, the last Legislature passed a State Fair bill, but when it came to the Governor for his signature, Governor Stuart did not see his way clear to sign it on account of the financial condition of affairs. We are still living, however, and we will go before the Legislature again next year, but in order to win, we must have the help of all the breeders and the dairymen and the farmers—every one of them. All these kindred organizations are working in harmony, and if we work together we will win, and I will serve you to the best of my ability.

I think there is no more business that I know of; if there is, I would like it brought before the Association at the present time.

There is one Resolution that I would like to see added. The press has been pounding the farmer for the increase in the cost of living. We have some data that should be brought before them. We know that in the past ten years there has been an increase of 20 per cent. in the population and a decrease of 5 per cent. in the production of meat. How can you expect the cost of meat to stay down?

Mr. Dodge—That was a Resolution that I wished to introduce myself, but, somehow, I could never get there when the Committee met. I see no reason why it could not be added now.

The President—We will now resume the discussion of "How to Improve Our Corn."

Prof. Gardner—I think I have noticed an improvement in the character of our corn exhibits, although the number of exhibits is only about half of what they were last year. We can explain that as due to the fact that this was a very poor corn year. The ears that are here are more uniform in character and better filled out at tips and butts than in previous years.

A Member—I don't think it would be a bad plan to have this state divided into different districts and have prizes awarded to the different districts. There is such a variety of soil and climate in this state that it is almost impossible for us to compete with each other and still have a fair show. In the South-eastern portion of the State—a section by itself—we have one variety, and in the North we have the ninety-day corn. If it were possible to grow this ninety-day corn in the South, it would not be fair to have the man from the North compete with you. I think it would be well to have a committee appointed to look into this, and I do not know of any one better qualified to fill this position than the professors at State College. Have them map out the different sections, and then offer prizes for the different sections. Of course, there might be an objection to this on the ground that there would be too many premiums, but if we can't have ten premiums, then let us have five, or offer five dollars as the first prize. It is largely a question of latitude and longitude, and this should be recognized.

Prof. Gardner—This suggestion is one that I have thought of several times, and it has been taken up at State College, but we have found it impracticable to section the State, because of the variations in soil and altitude. It may be possible that it can be done in some way. I think it is desirable that it should be done, and anything I can do to serve you in this matter, I assure you, I will be only too glad to do.

The President—Any more questions?

A Member—Is corn produced on low soil as high in protein as the corn produced on high soil?

Prof. Gardner — Theoretically, corn grown on high soil would be a little higher in protein than that on low ground. Starch is the last product that forms in the kernels and low land would, as a rule encourage a prolonged growth, resulting in high starch and consequently a slightly reduced percentage of protein.

A Member—In the selection of seed, would it be advisable to plant seed from an ear that was not thoroughly filled out?

Prof. Gardner—As a rule, it would not be advisable, although under some conditions it might not be inadvisable. Incomplete filling out of the ear is often the result of imperfect pollination. If this is the result of isolation or not having sufficient pollen brought in contact with the silks there would be no objection to planting from such an ear so far as inherent tendencies are concerned.

A Member—Is there anything in the theory that kernels taken from the body of the ear are better than those taken from the ends?

Prof. Gardner—I don't think so. All kernels on an ear have the same breeding. Experiments testing this point have shown equally as good yields from butt and tip kernels as from those on the center of the ear when an equal number of plants are compared.

A Member—When do you begin to detassel?

Prof. Gardner—As soon as the tassels appear and before pollen begins to fall.

The President—If there are no further questions, we will adjourn to meet again next winter.

I think the other section is still going on, up in the other hall, if any of you desire to go there.

ADJOURNED.

IN MEMORY OF MR. LEONARD PEARSON

Address by James Law of Cornell University

Death has struck a shining mark, our late lamented friend, Dr. Leonard Pearson, from whom we might still have expected a long and honorable career, has passed from us in the full bloom of his manhood, in the midst of his arduous labors, and with his plans for the future achievements undone. To us who have watched the gradual unfolding of this man, and his aspirations, the first feeling is that of arrested and blighted development. With a prolonged life, and continued mental vigor, and with the opportunities which were placed in his hand, Leonard Pearson would, in the nature of things, have rounded out a noble life by continual additions to his achievements and left a record which his premature death cut short.

But with a fuller and more philosophic view we recognize that our lamented loss is common in kind with the history of the Universe. Myriads of seeds go to destruction while only one sprouts and developes into another fruit bearing plant. Of the human family even, more than half have hitherto died in early infancy, so that an endless number of possible poets, philosophers, scientists and benefactors have been thus denied to an earth in which their help is only too sorely needed. Setting four score years as the limit of human life can we feel surprised that the second half of the race should be cut off in successive portions from the first to the eightieth year? The earthly career of the individual man is short at best and strictly limited to a period beyond which none may pass. The trained brain and the stored up knowledge, no matter how large in amount, must bend under the all-conquering hand of time, and leave but a memory—a record to fade away and be lost, unless taken up by others that come in succession and use these as stepping stones toward advance and greater and more beneficent achievements. The human paragon is but one in the great current crop of his season, and he cannot last over into the season following. But if with the skill and spirit of a Burbank the noblest of this season's product is garnered, and husbanded, and planted in the best productive minds of the seasons, to come, the Creator's great purposes are thereby subserved, knowledge is increased, science is stimulated and the advancement and evolution of humanity are secured.

The mills of God grind slowly. In these a thousand years are but as a day; a long succession of generations are charged with the elucidation of a great truth, and the preparation of the human mind for its admission, and the merit accorded to each is that of making a visible and lasting advance, which turn and pass it on a stage farther and nearer toward the ultimate goal of triumph. In the case of the individual, how often do we see the man who is cut off, in comparative youth, impress on the coming generations and centuries an impulse for good which the longest and most admirable lives have failed to accomplish. It is as if the enthusiasm of youth, concentrated in a strenuous though limited period, had made an irresistible appeal to the imagination, the devotion and the will had initiated a heroic work of an exceptionally lasting and fruitful character.

My acquaintance with Leonard Pearson dated from 1884 when at the age of 16, he entered as a freshman in Cornell University. He came of sterling, New England stock modified perhaps by successful enterprise in what is now the middle West. I already know his maternal Uncle George Jones, Professor of Mathematics in Cornell, who outside of his academic life had proved a power for good in the civic life of Ithaca by entering strenuously into every movement for the repression of crime and vice, and for the fostering of all that made for righteousness. Leonard, in common with his two brothers, both distinguished alumni of Cornell, partook largely of this sterling character, and that love of truth, which is such an essential foundation for a scientific career. He elected veterinary science as his life's work, took and excelled in such work in this line as Cornell then offered, and when he graduated in science in 1888, he joined me in Chicago, seeking a practical acquaintance with the work of the federal government in the extinction of lung plague in cattle, and he there assisted in a sanitary campaign, which for speed and thoroughness, has been unparalleled elsewhere.

While an undergraduate of Cornell he was honored by the insignia of the Sigma XI a lasting sign of the esteem in which he was held in scientific circles. From Ithaca he went to Philadelphia as offering, at that time, the most promising fount in America, from which to drink more deeply of veterinary lore. Here he so highly distinguished himself that, on his graduation he was at once offered the chair of veterinary medicine, to supersede the brilliant Huidekoper, with permission to spend his first year in Europe to garner for the subsequent profit of his Alma Mater such knowledge as the older and maturer veterinary institutions of the Old World had treasured.

Young as he was, with spurs untried, it was charateristic of the man that he should consider the matter deliberately before he should enter on a race which he must perforce recognize as a strenuous one. His most thought was the question of his own fitness for the proffered position.

"Fools rush in where angels fear to tread." But Leonard Pearson was no fool, and better still he thought first of his duties to his Alma Mater; to the profession—still young in America—to which he had just been admitted; and to the great public which must gain or lose according to the character of the work which he could bring into the field. He came to consult with me on the subject, and freely expressed his hesitancy and diffidence in thrusting himself into a position which demanded so much of its incumbent, and of assuming the position of teacher and mentor of many who had sat on the same seats with him as fellow students. It was fortunate that I was troubled with no such misgivings as to the case in hand. I had myself been called to teach when I had barely attained my majority, and I recognized that with a truth loving, earnest mind there is an advantage rather than otherwise in the early and continuous drill that comes from the necessity of a readiness to respond promptly to all appeals from students; there is a valuable training in close contact with many young aspiring minds and with the many points of observation from which they will individually view the same question. All this tends to give a breadth of view which can only come through the many suggestions thus presented. Acting on the right quality of mind in a proper state of preparedness this could not fail to prove a constant stimulant to growth and advancement. And I know enough of Leonard Pearson to realize that I had this stamp of mind before me. He was far removed from that overweening and ill-founded conceit which will rest satisfied with superficial acquirements dispensed with a glib confidence, which may momentarily repress inquiry and aspiration, but which cannot stand the test of time with increasing knowledge and greater deliberation. His compunctions yielded before the same views of the case presented by the older man, he recognized at once the responsibility and opportunity which providence had placed in his hands, he went to Europe—and we all know the result.

In the recollections of a long life spent in earnest efforts at serving humanity, in my chosen field, I shall always have the satisfaction that, in an hour that called for an important decision, I gave my earnest word toward saving Leonard Pearson for that work in which he has served so faithfully and successfully.

It would be endless to enumerate the sowings and harvest of even one life. Some, however, may be profitably recalled.

Students. The primary duties of our deceased friend centered mainly along educational lines and the students who came to the veterinary department to drink of the Pierian Spring carried away with them the memory of a true friend and inspiring teacher which in different states and nations will make his name a household word for many years to come! We recognize these students and alumni in the bureaus of the nation, in the sanitary work in the abattoirs and in the fields, on government and private breeding farms, in experiment stations and halls of research—men who took inspiration from his lips, example and direction, and in whose minds his name will be associated with all that they achieved and aspired after. He finds here his truest living monument, and as many of these men will furnish inspiration to others in their turn who will dare to say that we can judge of the volume and value of such a life by what appears here and now?

COLLEGE. The college buildings stand a solid monument in stone and lime of the work of the man as it appealed to trustees of the institution, and to friends outside. Perhaps no veterinary college in the country has been more liberally dealt with. We must go to Europe to find one that is better provided for. This stands as a measure of how his qualities impressed men at large, and though ostensibly a physical memento, it is more, inasmuch as it is to be the center of college life for many coming classes of veterinarians, and like the minds of those who were his immediate pupils, though to a less extent, they must carry down to coming generations the memory of the man who was so intimately associated with their construction.

LITERARY WORK. Coming to the literary work I wish I could name in a word the many different fields in which Dr. Pearson's activities were called out. Scarce had he taken his college position in Philadelphia before he was impressed with the importance of a veterinary journal which would give the best that America could produce in this line, together with the cream of the veterinary journals of Europe. In seeking to fill the gap he found the advantage of a working knowledge of the more important of the tongues of Europe, and he spared himself no effort nor toil in making these available to his American colleagues. For years he conducted the Veterinary Magazine until induced to relinquish the labor by increasing and imperative duties on the one hand, and by the revitalization of competing journals on the other to undertake a more complete foreign summary. Transient as was the life of the Veterinary Magazine it marks a stepping stone in the veterinary journalism of America, and is a lasting monument of

the earnestness, the ability and the tireless devotion of Dr. Pearson.

The interruption of the magazine did not interfere with his literary labors for students and colleagues. Works on matters of current interest to veterinarian, student and stock owning public came from his graceful pen as translations from old world tongue, and in the fields of sanitation, the sanitation of milk, of herds and interdependently of humanity he became well known to veterinary and medical readers. He no longer tied himself down to the continuous grind necessary to go to press on a given day each month; he could now work when a spare hour came to him and he could delay any undertaking when lack of time or need of sleep rendered this imperative. It thus became possible to do better work with less expenditure of energy than when it had to be undertaken as a race against time.

THE PROFESSION. In his profession Dr. Pearson early took and held a prominent place. As a practitioner in Philadelphia, as a consulting veterinarian at the College and outside, as a referee in public exhibitions and to her collections of animals, as an expert in connection with breeding problems, and in other ways, his services were highly esteemed and largely in demand. No less was this the case in connection with societies—veterinary and medical. He was habitually the holder of some office (from the presidency downward) in the state or national societies of his own profession; he was directly associated with the Henry Phipps Institute for the Study, Treatment and Prevention of Tuberculosis; and he was President of the Animal Section in the International Congress of Tuberculosis at Washington, D. C.

SANITARY WORK IN RELATION TO INFECTIOUS DISEASES. This is the field which of all others Dr. Pearson most assiduously cultivated. The subject was in the air. The sanitarian—medical or veterinary—dreamed of the severe restriction, if not the entire extinction of infection. Dr. Pearson became a recognized authority in such matters. He was repeatedly called by the federal government to advise in cases of doubt. In Pennsylvania he was made Secretary of the Livestock Sanitary Board and by right of skill and office its executive officer. It was his to form and direct a state veterinary sanitary organization. He was especially fortunate in finding official ears open to the need of research in these lines and a state farm and a state laboratory of research were placed in his hands, stocked for the purpose and with provision for maintenance. Among other things he availed of his opportunities to place restrictions on tuberculosis. He procured a statute providing that all dairy and breeding cattle entering the state must be tested with tuberculin, by operators approved by the State In this he placed the stockmen and community under a deep load of indebtedness. Unfortunately, it indirectly imposed a corresponding evil on such neighboring states as were unwise enough not to follow suit. No persuasion could induce our New York legislators to take precautions against the danger. They ignored it as long as they dared. Cattle tested and condemned as tuberculous could be driven or shipped into New York and sold as sound animals. Cattle were selected by the tuberculin test out of our New York herds and the sound shipped or driven into Pennsylvania, while the unsound were left to make the bulk of the remaining New York herd, thus concentrating the infection and rendering the disease more virulent and deadly. Again cattle coming from the West were tested in New York stock yards on their arrival, and the sound shipped into Pennsylvania, while those left as unfit were sold into New York dairy herds. Under this systematic propagation and intensification of tuberculosis in the herds of New York, the proportion of consumptive animals increased by leaps and bounds. In 1894 the State tests of suspected herds showed 4 per cent. tuberculosis; by 1900 the percentage in tested herds, had reache 10 per cent. and upward, and by 1908 33 per cent. Meanwhile our lawmakers remained obdurate. Then as the evil grew and became too notorious the sanitary bills were first quietly pigeonholed in committee, and when this became too brazen, they were enacted, with the protective clause so altered as to appear to grant a relief which was absolutely denied. All dairy cows and breeding cattle, entering this state, were to be tested with tuberculin, but it was carefully added that this should not apply at any point where the Bureau of Animal Industry maintained a federal inspection. The statute did not specify the nature of such federal inspections, but as such inspections of meats was maintained at all large New York stockyards, it followed that live tuberculosus cattle could still be introduced through these stockyards without any tuberculin test. The persistent purpose of sustaining an iniquitous trade and the juggling with words to prevent its interruption stands as a terrible arraignment of the committee in charge of these bills, I will not say of the entire legislature. At last when the vile odor of the wrong became unendurable, and when we secured a new Commissioner of Agriculture, the statute was really amended and long suffering New York was reluctantly allowed the privilege and protection which had pleased Pennsylvania so long before.

Under the direction of our departed friend, Dr. Pearson, Pennsylvania stockowners could have their private herds tested at State expense, and the condemned animals purchased and removed so long as the state appropriation sufficed to meet the cost. Or, the owner could segregate the affected cattle in a safe place, approved by the State and dispose of their products—milk and progeny—under proper safeguard. Few, I believe, availed of this last privilege though in the case of valuable thoroughbred stock the treasured strain of blood could thus be preserved, and the high-priced progeny raised safely on the sterilized milk of even their own tuberculous dams. One may go further and say that the milk of tuberculous cows can be sterilized and safely fed to human beings, so that under proper precautions to prevent contact with other herds and to destroy the bacteria present, the large supply of milk produced by even tuberculous herds, can be temporarily availed of for market uses, until the condemned cows can be disposed of profitably and safely. The calf with enormously greater susceptibility coming from its identity of genus and even of family, can be certainly raised on tuberculous milk and maintain perfect health, how much more then can man, whose susceptibility to the brand of the cattle tubercle bacterium is so much weaker, consume the sterilized milk with comparative impunity. My own experience with calves confirms this perfectly. In one large state institution with a dairy herd of 160 cows I found practically all tuberculous, and the extensive herd of pigs fed on the raw offal of the cows slaughtered for beef, perishing from the same affection. The very badly affected cows were at once disposed of. The less severely affected were placed by themselves until they could be slaughtered seriatim, and when fit for human food were fed to the inmates. The milk of these cows was boiled and fed to the pigs and to raise the heifer calves of the herd to take the place of their diseased dams. The tuberculosis among the pigs ceased to claim new victims, and the heifers grew up sound and in due time were used to form a new herd, absolutely healthy, and kept strictly apart from what still remained of the old one. In a few years all of the original herd had been disposed of in this way and had been replaced by a new sound herd of their heifer calves, raised on the sterilized milk of their dams. No fresh cows were brought in from outside, and for fifteen years that herd of 160 maintained a faultless record as testified by a yearly tuberculin test, and by frequent slaughters for beef purposes. The later history of the herd is, however, still more significant. The old steward of the institution died, and a successor was appointed who soon discovered that he could buy cows in the public market more cheaply than he could raise them. He was entreated to, at least, have all new purchases tested with tuberculin in the hands of a trustworthy expert. But again the spectre of prodigality appalled him. The vendors were shrewd enough to demand 25 per cent. more for every cow sold subject to the tuberculin test, so the untested market cow was preferred, and placed in the hitherto carefully preserved sanitary herd. Fatal mistake! The rational management of this large tuberculous herd, had made and kept it perfectly sound for fifteen years, then its neglect for a few years more left it just such a tuberculous group as it had been at first.

This record can be duplicated indefinitely. The most prolonged instance in my own experience is the Cornell university herd which formerly largely affected with tuberculosis, was purged of the pestilences and kept so for about thirty years. During this period in the yearly testing, a bull, or other animal, brought in from an outside herd would be condemned for tuberculosis, and in the past few years animals, bought for experimental purposes have as a rule been condemned for the same disease, but these have been invariably detected and eliminated by the yearly tuberculin test, while the University herd proper has maintained its immunity. On one or at most two occasions only an animal standing adjoining to one of these imported diseased ones had contracted the affection.

The method of dealing with herds by separation of the reacting animals and sale of the products, has been adopted more largely in Denmark than elsewhere, and has been widely advertized as Bang's method, but as practiced by Bang it comes short in one most important particular. It does not forbid sales out of the tuberculous segregated herd. It does not even seem that such a sale is conditional on a tuberculin test of the animal. The purifying of the individual herd that has been separated and held under government control is the primary object, and no additions to that herd from outside are allowed. But the sale of animals from such segregated herds, to be taken into other herds, not under government control, it is but an invitation to an outward diffusion of infection into other herds, through incipient and occult cases, and thus it becomes a loophole for the extension of the infection outward from the otherwise carefully secluded, government control herds. It is easy to free such government control herds from the affection in a few years' time, but thus is a most imperfect triumph of sanitation if other herds are meanwhile being infected by stock carried out from the secluded herd, which we are making every effort to free from infection. The two acts are mutually opposed and from the point of view of the State sanitation the evil effects of one are continually undoing many of the good effects of the other.

Bang recognizes the evil and would gladly obviate it if the thought of the community at large would sustain him in such an action. Dr. Pearson never sanctioned such contradictory measures in Pennsylvania. With him the invoking of State aid to purge a herd of infection involved the making of a contract which guarded against any future loophole for the escape of infection from the secluded herd. And this position is the only logical and tangible one. Exception to this rule could only be permissible when the animal from the secluded infected herd was to go to another infected herd and remain there, or in case it was to be kept by itself securely isolated from all other animals, or again if it was to pass direct to the abattoir for immediate slaughter.

In making this criticism no condemnation of Bang is intended. He saw and approved the more perfect way, if the less perfect was alone possible in his community, he was not so arrogant and opinionative as to refuse the lesser good which was within his power. By yielding a point he has been able, without it, to accomplish a confessedly imperfect, yet still splendid sanitary work, and at the same time prepare the mind of his compatriots for a more perfect work in the future.

SANITARY RESEARCH. In the field of sanitary research, which was liberally opened to Dr. Pearson, many lines of inquiry were followed with excellent results. Among the notable things done in the research laboratory were the identification of a pestilence of horses in America with the contagious lymphangitis of the Old World, and the future identification of the deadly dysenteric affection of imported Jersey cows and others that had lived with them, with the disease of Johne, caused by an acid-fast bacterium having a certain resemblance to the bacterium of tuberculosis. But that which was aimed at immunization against the tubercle bacterium appealed most powerfully to the great body of humanity. The great public, realizing rather dimly, it is true, that certain diseases like smallpox, sheeppox, anthrax, measles, scarletina, lung plague, rinderpest and others do not occur a second time in the same individual system, a first attack being followed by a prolonged (often life long) immunity, entertained an earnest hope and expectation that the great white plague could be met successfully by immunizing measures and that the greatest pestilence of man and beast might be finally conquered in this way. The demand became almost imperative on sanitarians to enter on this field which to the average mind appeared so promising. To the skilled and mentally well balanced pathologist, however, the field was less inviting than to the layman. Tuberculosis belongs to a class of diseases in which a first attack imparts no complete immunity for the remainder of the lifetime, nor even for a prolonged period. Some subjects of the disease unquestionably recover, having inherently a much stronger resisting power to the tubercle bacterium than have others. Some on the other hand are so little resistant that they run down rapidly to a fatal issue and die in a few weeks. If these two classes of victims were the only ones, we would have a much more satisfactory basis for a system of immunization and even for the extinction of the plague by working along well known lines. But, unfortunately, of tuberculous subjects living under good hygienic conditions, the great majority do not die promptly, nor recover absolute health in a short time, but they remain for years with dormant tubercles in their system, containing living bacteria, ready to start new centers of the disease in any susceptible animal in which they may be implanted. Many of us can recall the cases of human consumptives who had been attacked in early youth, yet attained to the age of three score and ten, all the time bearing tubercles, slowly evolving or receding, and in either case containing germs of the redoubtable disease. The individual man, suffering in this way, claims, not only the right of survival, but also that of mingling freely with his fellowmen in conducting his business or occupation. But in the case of the lower animals we have a different problem. The individual animal has not an inalienable right to life, on moral and legal consideration, nor has its owner any such right to demand this. The animal is but a chattel, if it be a living chattel, and when it has become a source of danger and pestilence to others, it becomes a nuisance and pest to be abolished or put under complete restraint. The comparative value of our one infecting bovine animal, for example, and of our 74,000,000 cattle, more or less remotely exposed to it, at once puts out of court any plea for its preservation as a mere question of economy. The government, that is the whole people, ought to indemnify the owner for the loss of any stock taken to prevent a pestilence from gaining a footing. The question of the destruction or strict isolation of infected animals must be determined by many attendant circumstances and conditions. The fatality of the affection: the diffusibility of the virus; the proximate density of the population of susceptible animals; the duration of the disease in the individual and herd; the extinction, or otherwise, in the body of the victim of the disease—germ on recovery; the prospective value of the progeny of high class or thoroughbred infected animals; are very prominent considerations in this connection.

In the disease now under consideration—tuberculosis—there are two conditions which render it possible, in desirable circumstances, to substitute a perfect seclusion for destruction.

First, The bacterium of the familiar tuberculosis in man is not readily and virulently transmissible to most cattle; and that of the most familiar tuberculosis in cattle is not so easily adaptable to man as it is to other cattle. Exceptions occur, susceptible individuals of the one genus (man or cattle) will entertain and succumb to the bacterium drawn from the other genus (cattle or man) and are then able to transmit the germ back to the first genus from which it was drawn, and to the constitution of which it has become peculiarly adapted by a long habit of living in such germs. In this way the ox, infected from man, may prove highly dangerous to man, though it has comparatively little danger for other oxen. Similarly man infected from the ox may carry little risk to his fellow man though peculiarly dangerous for the ox. If therefore infected cattle are thoroughly secluded, and if the health of the attendants and visitors of these cattle is well attended to, it becomes possible to control any escape of the bovine germ through the system of man.

Second, In the slight chronic cases of tuberculosis in cattle, which alone would be preserved for breeding purposes, the areas of tubercular deposit are usually narrowly circumscribed and largely situated in solid organs or in closed cavities from which the bacteria do not usually escape in quantities, unless in case of sudden extension or generalization. It thus becomes possible, under proper expert control, to weed out such as are becoming dangerous, and to prevent injurious concentration of tuberculosis in the herd, or the diffusion of infection to animals outside. This furnishes a sufficient basis for safe research in the disease whether in the line of attempted immunization or medical or hygienic treatment, or otherwise. But it can never excuse any laxity in the seclusions, nor, above all, any movement of animals from the secluded herds into others.

In this connection I cannot avoid mentioning the traffic from herd to herd as one of the most prolific means of spreading tuberculosis. The dealer buys from all and sundry, and the animals offered to him are too often such as the vendor has become dissatisfied with (possibly already tuberculous). He takes these animals to his stables and feeds them from mangers where other cattle are to follow in rapid succession, and where each can pick up any germs left by its predecessor. Finally all of them pass out into other herds and in many cases they plant tuberculosis. This disease is peculiarly favorable to such diffusion inasmuch as the tuberculous subject, put upon the market is usually an occult case and the disease cannot be detected by an ordinary observer.

The only other bovine malady which approaches tuberculosis in this respect is contagious abortion. The victim of this is usually in apparently good health, and it is only months after the transfer of the animal that abortion supervenes and suspicion may be aroused. The deplorable result is that, in our dense dairying districts, it is rather the exception to find a herd in which this abortion has not gained a footing. The one remaining redeeming feature is that after one or it may be two (rarely three) abortions the same cow does not repeat the act. But she still carries the germ, and may transfer it to new herds into which she may be removed without revealing herself as the true source of the trouble.

To return to the tuberculosis research. It was expected that Dr. Pearson should undertake this, and on it he went honestly to work. Like some others working in the same field, he found that under good hygienic conditions, animals with strong natural resistance to tuberculosis, under carefully graduated doses of tuberculin toxins, or when injected with tubercle bacteria which had been long grown in genera widely different from the stock experimented on, could, in favorable cases be started on a course of improvement, or could be endowed with an increased power of resistance, so that a percentage of animals with the incipient disease could be said to be cured, and another percentage in good measure immunied. But he could not shut his eyes to the facts that a large portion of the infected animals were not cured, that a number of the sound animals could not be immunized, even in measure, and that in those that did acquire a measure of immunity, it was not sufficiently powerful and lasting to constitute a satisfactory basis for a general sanitary system to be carried out by a whole community or nation. For a year, or while kept in very superior hygienic conditions, the manipulated animals escaped, but in the lapse of time they gradually lost their power of resistance and when subjected to close confinement or other specially unwholesome conditions, in the presence of the bacterium, they succumbed to the disease after the manner of other cattle. This was a denouement calculated to try the experimenter's souls. He had secured what might be called a flattering success, but at best it was too partial, uncertain and transient to be made the basis for a complete extinction of the pestilence. There was a strong temptation to make the most of it and come out as the conqueror of the great white plague. But Leonard Pearson was made of nobler stuff, and while acknowledging favorable results, he never once claimed that he had secured a good working basis for a system leading to tuberculosis extinction in state or nation. The most that he allowed himself to say was that the matter was still undecided.

I don't wish to pose as an iconoclast but it is due in our deceased friend, Dr. Leonard Pearson, that I should contrast his worthy action, with that of others who have stood high in public praise. Robert Koch, the discoverer of the tubercle bacterium, on just such an infirm basis exploited his tuberculin, putting it on the market as a great tuberculosis remedy, and concealing the method of its preparation as long as possible to indefinitely prolong his golden harvest. Von Behring, following the other line of using tubercle bacteria which were not habituated to living in the genus operated on, is still exploiting his "bovovaccine" as at once a cure and preventive of tuberculosis. It matters not that his successes were of the same partial and imperfect kind as Dr. Pearson's, his misleading advertisements still glare upon us from the pages of every stock journal. Were the application confined to man, who might claim that the help for him as an individual, may well outweigh the cost of maintaining in our midst, and indefinitely, the germ of the dread scourge, there would be at least a shadow of extenuation, but when exploited as "bovovaccine" for use upon animals alone in which the bacterium shall be stamped out once for all, it is much harder to excuse.

Leonard Pearson, however, nobly stood the test. He kept his eye steadily fixed on the imperishable prize of the true scientist and sanitarian. He swept aside every suggestion of remunerative mercantilism, and, what would have been perhaps more attractive the public applause of one who was reputed to have overcome the great white plague, and remained true to his best ideals. Let us treasure this devotion to trust as the crowning virtue of his career.

We lament his early death, but this is largely the fate of humanity. We honor him for his faithful work during his all too short existence. We recognize that real worth is shown by doing well what each successive day brings to be done. He who does this, be his life long or short, has well fulfilled his mission and well deserves the victor's crown. We cannot, any of us, wholly control and determine our life. We cannot choose that we shall be born in one century or land rather than another; that we shall grow to a given stature; that we shall have the option of building on foundations laid by great men or small ones; that we shall live and work 30 years or 80; but we can determine whether in our age and our country, with our inherited knowledge, our years and opportunities we shall make the most and the best of what is placed in our hands. "Act well thy part, there all the honor lies."

WATKIN G. POWELL

Watkin G. Powell, a member of this Association from Wyoming, died Saturday night, April 9, 1910. Mr. Powell was one of the firm of Powell Bros., who have been for many years extensive breeders and importers of cattle, horses and sheep. He was a great student and experimenter, and perhaps no one was better versed in the laws or principles of breeding than he. A talk with him on this subject was an experience not to be forgotten, for he had made many experiments in breeding

and crossing, and his fund of experience was always at command through his remarkable memory. He was associated with all efforts for livestock improvement in this state and in the country. Since its origin he had been a member and an officer of the Pennsylvania Livestock Breeders' Association, and his devotion to the betterment of livestock never failed. The meeting at Philadelphia he was compelled to miss on account of ill health, but his interest in it was attested by several letters offering suggestions for further progress. Personally he was a most genial and likable man, and he will be sadly missed by a large circle of friends in several states.

LIST OF MEMBERS OF PENNSYLVANIA LIVE STOCK BREEDERS' ASSOCIATION

Name	Postoffice
App, D. Norman	Selinsgrove
Armsby, Dr. H. P	State College
Andrews, D. C	West Newton, R. 2
Andrews, J. C	Mattie
App, F. S	Millersburg
Arbuthnot, Dr. T. S.	Pittsburg, 5th Ave.
Arkcoll, W. W. Blake	Paoli
Bronson, John W	New Galilee
Blair, James	Hartstown
Bebout, J. C	Canonsburg
Berry, R. P	Eighty-four, R. 3
Berry, John M	Wylandville
Berry, S. W	Canonsburg
Barnhart, Geo. S	Greensburg, R 4
Black, W. C	Mercer
Black, George	Dayton
Buchanan, Chas.	Utica
Barley, J. I	Baker's Summit
Burns & Adams	Imperial, R 1
Bughman, H. C.	Pittsburg, Hays Coal Co.
Burgin, John H	Huntingdon Valley
Brownlee, N. O	Claysville
Benninger, W. M	Benningers
Blyholder, S. S	Neale
Barber, Col. S. F	Harrisburg
Barclay, Dr. W. F	Pittsburg
Burket, John W	Tyrone, R. F. D.
Bender, Dr. H. E	Lititz
Berger, A. C	Etters
Baird, Benjamin B	McClellandtown
Barton, H. A	Murdocksville
Baldridge, W. H	Latrobe, R. 1
Brookmead Farm	Devon
Burr, H. R	Brandywine Summit
Bayard Bros.	Waynesburg
Cassidy, John & Son	Hanlin Station
Campbell, E. M	Leechs Corners
Cummins, John	Waynesburg
Crothers, R. W. & Son	Taylorstown
Cooper, M. A	Washington
Christley, W. G	Mercer
Christley, W.	Slippery Rock
Clark, M. N	Claridge
Cowan, Jas. H	Duquesne
Comfort, H. W	Fallsington
Chambers, W. H	Claysville
Critchfield, Hon. N. B	Harrisburg
Carpenter, G. M	Wilkesbarre
Conard, Dr. M. E	Westgrove
Cowan, Peter B	Brookville
Carroll & Sons, G. W	Jackson Center
Conley, H. D	Etters
Cloud, G. M	Kennett Square
Cochel, Prof. W. A	State College
Courtney, R. B	Haverford
Drubler, E. S	Media
Davis, Mrs. Parker	Newtown
Dain, J. Grier	4........Malvern
DeFrance, Albert	Sandy Lake
Demming, Col. Henry C.	Harrisburg, Box 5
Douthett, L	Evans City, R. D. 33
Detrich, Rev. J. D	Scranton
Dickson, A. M. & Son	Cochranton, R. 66
Dick, George A	Kane
Davis, W. H	Washington
Dickson, W. S	Bakerstown
Erk, George	Seelyville
Eardman, A. H	Wiconisco
Earnest, Geo. M	Greensburg
Evans, J. Wolf	Spring Mills
Elder, H. C. & M. R	Darlington, R. 1
Eagley Bros	North Springfield
Eagleson, A. S. & Sons	Washington
Erdley, T. J	Lewisburg, R. 1
Fugate, G. I	Ellsworth
Finger, John E	Honey Brook
Fleming, Jos. T	Belleville
Ferris, B. E	Hector
Fry, Wm. H	Greensburg
Filbert, R. Y.	Philadelphia, 1811 Spring Garden St.
Fritz, Mrs. Sarah B	Duncannon
Ferguson, W. H.	Altoona, 112 E. 5th Ave.
Fielden, Henry	Devon
Glover, J. H	Vicksburg
Gibbons, Dillon	Yohoghany
Gammell, E. W	Bethany
Grove, L. D	Holbrook
Gable, Wm. F	Wyebrooke
Glasgow, Clarence M	Calvin
Gray, W. H	Brookville
Gay, Prof. Carl W.,	Philadelphia, Uni. of Pennsylvania
Gabler, B. F. & Son	Greensboro
Groff, A. A	Telford, R. 2
Guthrie, J. M	Indiana
Guthrie, W. H	Indiana
Gilliland, Dr. S. H	Harrisburg
Hunter, Lyman	Hartstown
Hoopes, Herman	West Chester
Hamilton, Prof. John	Washington
Harrison, Wm. W.,	Philadelphia, 119 No. 11th St.
Henderson, Jas. L	Washington
Holtzer, W. F	Greensburg
Henderson, J. B	Burgettstown, R. 48
Hustead, J. M	Uniontown
Hartley, R. S	Youngsville, R. 2
Harman, T. D	Pittsburg
Henderson, H. E	Buenavista
Hart, Dunning	Washington
Hogg, Geo. A	Pittsburg, 24 Railroad St.
Hunt, Dr. Thos. F	State College
Hutchison, G. G	Warriorsmark
Hopkins, W. W	Aldenville
Hershey, C. A	Gettysburg, R. 5
Hull, D. W	Waymart
Herr, J. A	Millhall
Hubbard, F. N	Troy, R. 63
Homer Bros.	Greenville
Holland, John B	McDonald
Hartstown, Grange (No. 1233)	Hartstown
Houghton, J. Paul	Paoli

Innes, J. K..............Binghamton, N. Y.
Isett, Sidney T..............Spruce Creek

Johnston, Wm. R.............Schwenkville
Johnson, Edwin ....Taylorsville
Jager, Theo. F......................Lebanon
Jones, B. F.................South Montrose
Jones, Daniel W.....................Wilmore
Johnston, Ira W.......................Butler

Knisley, R. J..............................York
Keim, William P.................Pottstown
Klein, Dr. Lewis A............Philadelphia
Knarr, W. H.....................Greensburg
Knapp, G. H......................Aldenville
King, L. K..........................Westfield
Kepple, John B.................Greensburg
Kloss, D. S............................Tyrone
Kimmel, A. G..........................Berlin
Keystone Morgan Horse Co.......Dilltown
Kennedy, W. T..........................Mars
Kidd, J. H...............................Mars
Kaufman, Leo..Pittsburg, 206 Second Ave.
King, M. G.......................Mount Wolf

Lockett, Dr. Stephen,
Philadelphia, 39th and Woodlawn Ave.
Lyon, H. M. & Sons............Wyalusing
LeMoyne, Julius ....Washington
Lighty, L. W...................East Berlin
Lindsey, James & Sons...............Utica
Lantz, J. F. & Co...................Malvern
Leonard, A. & Son.......................Troy
Love, R. S............Mount Pleasant, R. 1
Levis, F. W............Chadds' Ford, R. 1
Ludwick, S. R.......................Sheridan
Long, I. S...........................Richland

McCready, Dr.,
Pittsburg, South Highland Ave.
McCreary, Samuel ....Volant
McCoy, Robert ....Slippery Rock
McSparran, W. F......................Furniss
McCleary, Wm. L.............Washington
McCoy, W. A. & F. W...............Mercer
McKeehan, Benj. W............Mountrock
McDowell, S. V. & Sons...........Fredonia
McSparran, John A.................Furniss
McKee, T. M.............Lewistown, R. 1
McKee, Irwin F.........Washington, R. 10
McClure, J. H...........................———
McNeil, Dr. J. C.................Pittsburg
McKean, Henry P..................Penllyn

Moore, Robert ....Glenmoore
Marshall, Dr. C. J..Philadelphia, 2004 Pine
Mairs, Prof. T. I.............State College
Mollenaur, Henry P....Eighty-four, R. 1
Morris, J. Cheston, M.D.,
Philadelphia, 1514 Spruce St.
Mattern, J. C & Sons.......Hollidaysburg
Monroe, W. J.............Greensburg, R. 3
Munce, R. L.......................Canonsburg
Meloney, James ....McDonald, R. 89
Martin, Hon. A. L..............Harrisburg
Main, J. M. & Sons...........Shippensburg
Miller Bros. ....Stonybrook
Michener, Ezra ....Michener
May, L. D.................Granville Center
Murphy, Jas. L......................Reedsgap
Miller, A. K......Pittsburg, 708 Penn Ave.
Martin, Rev. D. C..................Pittsburg
Minner, Ralph ....Mercer, R. 7
Markle, A. F..................State College
Metzger, Dr. A. H.............Millersville
Miller, N. G...........................Marion
Mitchell, C. T..................Brandamore
Munce, Dr. T. E.................Harrisburg

Norton, W. C........................Waymart
Nivin, S. E........................Landenburg
Nelson Bros. ....Grove City

Notestine, D. E..................Lewistown
Nevius, J. D.
Philadelphia, 1027-29 Real Estate Trust Blg
Naginey, R. A..........................Milroy
Nicholson, R. S............Kittanning, R. 3

Powell Bros. .... Shadeland
Perham Bros. ....Niagara
Peck, J. E.......................Carbondale

Okey, J. W.......................Bryn Mawr

Post Bros. ....West Alexander, R. 2
Phillips, Henry H......Pittsburg, Box 235
Poorbaugh, Nelson ......Mount Pleasant
Palmer, Henry ....Avondale
Paxton, Jas. M.......................Houston
Peachey, J. H.......................Belleville
Patterson, L. A....................Carbondale
Paxton, Geo. G. ....Houston
Parry, Thos. L......West Chester, R. D. 5
Page, R. Holmes...........................Paoli
Peters, Ulysses..........Slatington, R. D. 1
Patterson's Sons, R. P..........Carbondale
Paxton, J. G..........................Houston
Penshurst Farm ....Narberth

Quivey, John W. ....Houston
Quivey, J. M. & Son...............Houston

Roberts, L. L.........................Malvern
Raub, J. M............................Midway
Raub, H. G.........................McDonald
Riechert, J. H.......................Scranton
Reeder, M. E.....................Muncy, R. 2
Rink, W. H.....Johnstown, 412 Park Ave.
Randt, Henry H.................Pipersville
Ridge, Dr. W. H....................Trevose
Replogle, A. T....................Waterside
Riddle, W. H. H........................Butler
Reeder, J. H...........................Muncy
Roberts, Mrs. E. L.................Malvern
Roberts, Sidney ....Malvern
Royce, Chas. A...........................Bala
Riddlemoser, H. E.........McKnightstown

Smith, A. W................Leechburg, R. 1
Sturgeon, W. J....................Kittanning
Shrum, W. F......................Adamsburg
Spedding, Nelson ....Clifford
Shaffer, A. G. ....Rural Valley
Stevenson, W. E.............Burgettstown
Stevenson, W. S...............Butler, R. 3
Shoemaker, M. P. & Bros.,
Greensburg, Box 333
Strosnider, Geo. G............Waynesburg
Shannon, R. F.........Edgeworth Station
Smith, J. D.............................Castile
Shaffer, S. ....New Castle
Scott, Lee R....................Burgettstown
Shively, T. M......................Mifflinburg
Shook Bros. ....Spring Mills
Snavely, H. H..........Willowstreet, R. 1
Stouffer, J. L......................Southwest
Snyder, E. L................Mount Pleasant
Stephens, M. B...................Johnstown
Sharpless Bros.,
Philadelphia, 705 Walnut St.
Suter, W. T.........................Riverside
Sharpless, J. P.................Londongrove
Stewart, F. B............Espyville Station
Silvis, J. H...............Greensburg, R. 3
Scheirer, F. A......................Slatington
Straub Herman..Pittsburg, Carnegie Bldg
Straub, Norman F...........Murdocksville
Smith, Henry ....Finleyville, R. 1
Steele, Dr. B. P.................McVeytown
Sprouls, Elmyas ....Washington, R. 2
Sankey, W. A...................Spring Mills
Sharpless, Joshua ....Londongrove
Sharpless, Thomas ....West Chester

Thomas, Chas. L...........King of Prussia
Truxal, J. R...............Greensburg, R. 6
Thompson, W. M................Uniontown
Traver, F. E...............Rhinebeck, R. 49
Turnbull, Dr. Thos.,
Allegheny, 835 Western Ave.
Thompson, Jas. I....................Lemont
Thompson, Wm., Jr.................Lemont
Taggart, C. L...................Washington
Throop, W. F............Espyville Station

Vance, R. C...........Burgettstown, R. 48
Van Tassel, A. R.......................Dubois
Van Norman, H. E...........State College

Wilson, R. C....................... Newtown
Wright, George B..............Schwenkville
Worden, A. S................Frederick, Md.
Williams, Wm. R.,
Germantown (Phila.) 441 W. Springhurst
Wylie, J. B......................Washington
Warren, A. P.......................Elizabeth
Woodmansee, J. E..............Lake Como

Walter Edward ....West Chester
Wilson, Geo. H....................Morganza
Wakert, Wm. P. ....Tillie
Wirt, John O.....................McVeytown
Webber, Dr. S. E.................Lancaster
Waite, D. H...................Warriorsmark
Way, R. Orlando.............Warriorsmark
Walker, G. D...........................Salona
Westmoreland Agr'l Society...Youngwood
Wagner, W. F................Harrison City
Wells, Maj. Levi................Spring Hill
Wiley, W. L......Pittsburg, 5000 Lytle St.
Wise, W. S........................Meadville
Wilson, O. N.........Pittsburg, 227 Market
Wyebrook Grange (No. 1306)....Wyebrook
Waugaman, J. A................Greensburg

Young, R. I......................Middletown
Young, A. P..........................Millville
Yost, H. Y.................Reading, Box 487

Zook, John F.......................Belleville

END OF YEAR